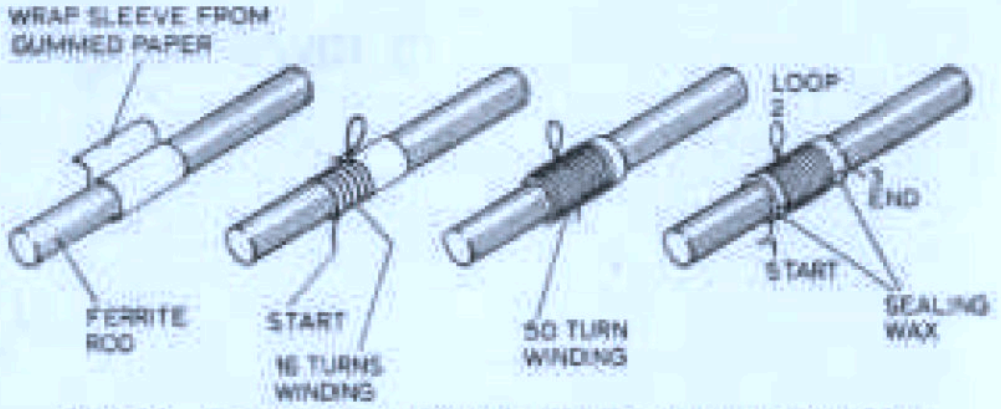


Fig. 3.1 Aerial tuning coil wound from 38-s.w.g. wire on a $\frac{5}{16}$-in. diameter ferrite rod.

Fig. 3.1 details the construction of a suitable coil for a tuned circuit, matched to a ferrite rod of $\frac{5}{16}$ in. diameter and about 4 in. long (see Chapter 4 for alternative coil windings on different rod sizes). If a rod is purchased longer than 4 in., it can be used as it is, or cut down by marking around with a file and then breaking off the surplus length.

Cut seven 1-in. lengths of gumstrip. Moisten one and wrap around the rod gummed side up. Now add about another half a dozen wrappings of similar length over the first, this time with gummed side *down* to form a reasonably rigid tube. Make sure that the paper tube is a *sliding* fit on the ferrite rod and leave to dry thoroughly (preferably removed from the rod so that it cannot become stuck to it).

When the paper tube is quite dry it should be rigid, when the coil windings can be applied. The wire to be used is 38-s.w.g. enamelled copper wire, the number 38 referring to the actual diameter of the wire according to the standard wire gauge (s.w.g.).*

Starting about $\frac{1}{4}$ in. in from one end of the paper tube, wind the wire carefully round the tube, with each turn tight against the one before it, until sixteen full turns have been completed. Then make a loop in the wire, as shown, and carry on winding, with succeeding turns touching, until fifty turns in all have been completed. The two loose ends of the coil (the start and finish) can be secured with a dab of sealing wax whilst the projecting loop can be twisted together (e.g. by putting a pencil through the loop and twisting up). Cut off the loop, leaving about $\frac{1}{2}$ in. protruding from the main coil, bare the wire ends and solder together. This forms point 2 on the coil; the start is point 1, and the end point 3—see Fig. 3.1. It will be easy to remember these

* American wire gauge (AWG) is about two sizes smaller than the British standard wire gauge (s.w.g.). For example, 38 s.w.g. is approximately the same as 36 AWG.

without marking since the loop or tapping point (2) comes much closer one end (1) than the other (3).

Cut a panel of *Paxolin sheet* to about the size shown in Fig. 3.2, using a hacksaw.* On this secure a *tag strip*, as shown, and drill a hole to mount a miniature or small-size 500 pF *variable capacitor*.

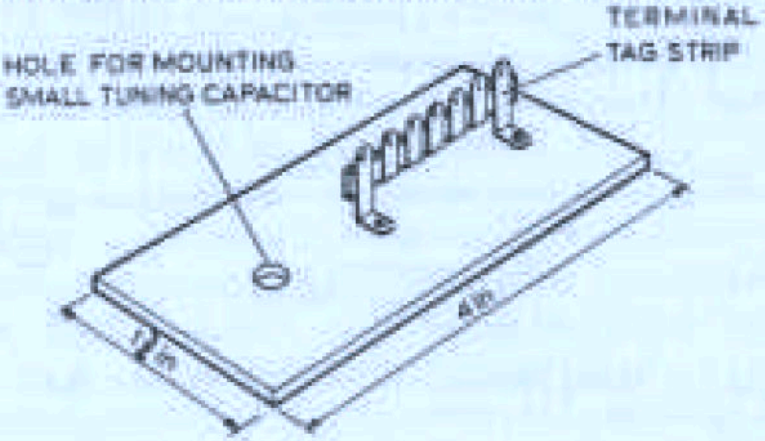


Fig. 3.2 Paxolin panel and tag strip for crystal set circuits.

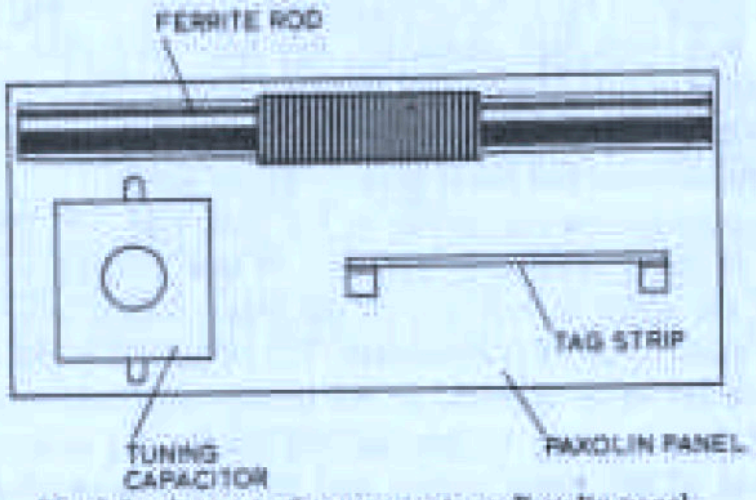


Fig. 3.3 Layout of components on Paxolin panel.

The aerial coil is then mounted on the panel as shown in Fig. 3.3, gluing the coil on to the Paxolin with two or three dabs of sealing wax, or some other suitable adhesive. *Note:* the ferrite rod must be free to slide in the paper tube for 'tuning' adjustments.

Virtually any miniature germanium or silicon diode will be suitable for the detector. Recommended types, which are readily available, are 1N34 and 1N914.

Earphones must be of *high-impedance* type, which need not be expensive to buy, and the higher the impedance the better the reception.

* A phenolic or fiberglass sheet may also be used.

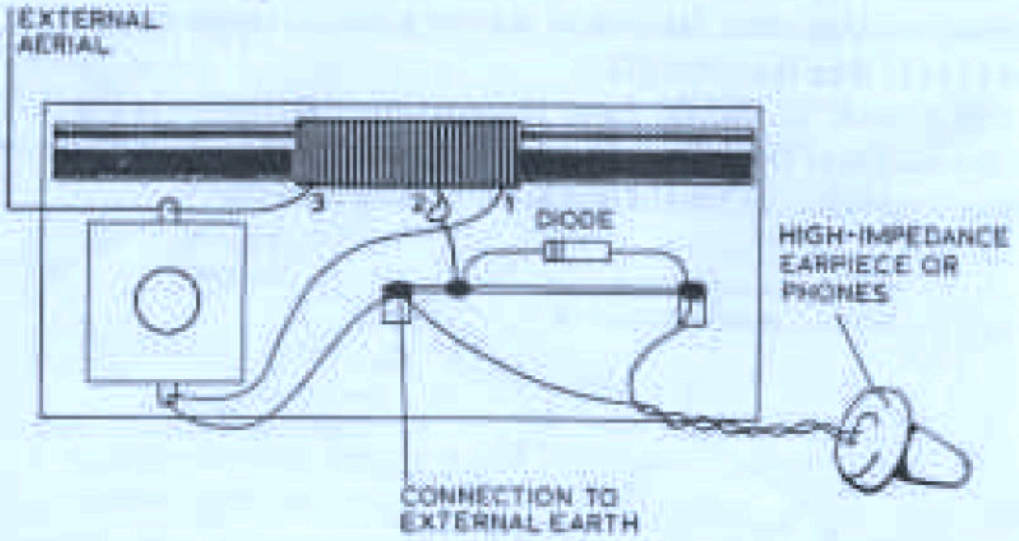


Fig. 3.4 Wiring connections to complete the crystal set.

Alternatively a deaf-aid type earpiece can be used; this will not give the same volume or quality of reproduction as headphones, but is a less expensive component. This should preferably be of the *high-impedance magnetic* type, with high sensitivity. Any high-impedance earpiece will suffice, but if of crystal type will require a resistor, connected across it, to complete the circuit. This will reduce the amount of current flowing through the earpiece and lower the strength of signal.

Wiring connections are shown in Fig. 3.4. End 3 of the aerial coil (the end of the 50-turn coil) connects to one terminal of the tuning capacitor, the aerial or 'hot' end of the tuned circuit, and the point to which an external aerial is connected. The other end of the coil (end 1) connects to the other terminal of the tuning capacitor, from which an additional wire is taken to the first tag on the tag strip. This is the 'earthy' end of the tuned circuit, and the point to which an external earth is connected. Leave plenty of slack wire between the coil and tuning capacitor.

The other connections are then as follows:

(i) Tapping point of the coil wire bared and connected to the second tag.

(ii) The diode also soldered to this same tag, and to any other free tag.

(iii) Headphone (or earpiece) leads to the 'earthing' tag, and to the 'free' tag to which the above diode has been connected. All connections should be made with *soldered* joints.

The wiring-up can be checked against the *circuit diagram* shown in Fig. 3.5 (ignoring the components shown with broken lines). The set should now be 'working'.

In areas of strong signal strength, no external aerial or earth connections should be necessary. Performance will, however, be improved in any area by attaching an aerial wire (which can be any thin wire, e.g. using the same wire as for the coil winding), of up to 160 feet. The longer the aerial the better the reception, provided it is led away from the receiver to as *high* a point as possible.

An earth connection may further improve aerial performance; by this we mean a connection to some conductor positively in contact with the ground (preferably buried), an excellent example being a metal water-pipe. Thus, if an earth connection is found to be necessary (or you want to try one to see how performance is affected), connect a wire from the 'earthing' tag on the receiver to a convenient water-pipe.

This question of obtaining a *good* aerial and earth is a most important one in areas of poor signal strength. Linking up to a television aerial is often a good plan, since TV aerials are also usually mounted as high as possible. If bare wire is used, it is also important that the upper (free) end of the aerial is not made fast to something which could produce an earth connection (e.g. a damp tree), or at least is suitably insulated from such a support. String is not an efficient insulator; that, too, can conduct when wet.

Quite good results are often obtained by using the springs of a bed as an aerial, in which case an earth connection is usually not necessary. Sometimes, too, when other attempts to yield a good signal strength in

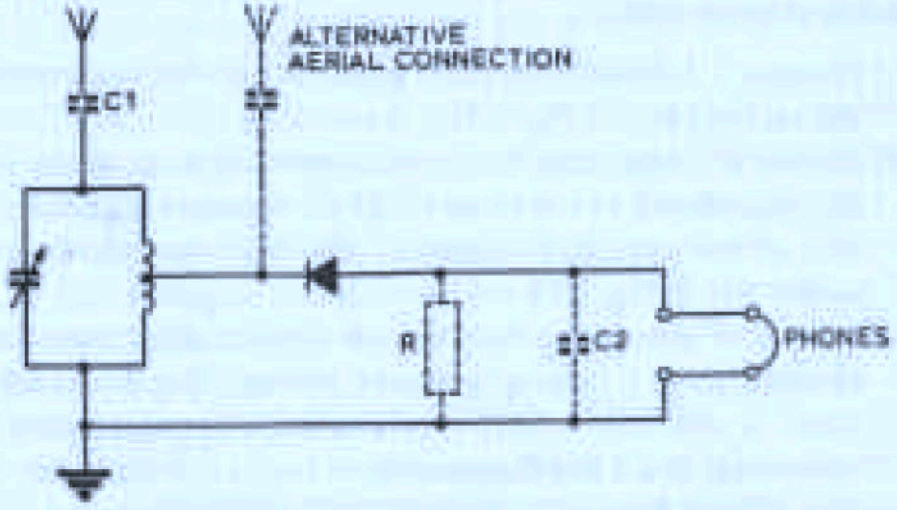


Fig. 3.5 *Circuit I.* Circuit diagram of basic crystal set.

the aerial have failed, connecting the *aerial* side of the tuning coil to a *good earth* (a water-pipe) can produce better results, the normal earth connection being left off.

Tuning

The receiver is adjusted as follows. Turn the tuning capacitor to fully close the vanes, then open about half a turn on the spindle or knob. (If you are using a trimmer as a tuning capacitor, screw right down and then open half a turn.)

The tuning coil should now be slid up and down the ferrite rod (the coil leads were left a fairly long time to give the necessary freedom of movement) until BBC Radio 3 is heard.*

It may be necessary to slightly alter the adjustment of the variable condenser to tune in to this programme. Also, because of the ferrite-rod aerial the set will be directional, that is, the signal strength received will depend to some extent on the direction in which the aerial rod is pointing, so position the set to pick up the maximum volume.

Having established the best position of the tuning coil on the rod to receive BBC Radio 3, fix permanently with a dab of sealing wax. You should then find it possible to tune in to further stations by altering the setting of the variable capacitor—e.g. typically Radio 4 in about the middle of the capacitor travel and Radio 1 towards the other end.

Any reception you get will almost certainly be very weak and (unless you live close to a broadcast station) you can really feel satisfied if you get any station at all at audible strength. But it is surprising how, sometimes, even quite distant stations can be heard. Also you can often improve the reception and listening strength by quite simple modifications. Try these in order:

(i) Connect a 1,000-pF capacitor across the headphone (earpiece) connections (C2 in Fig. 3.5).

(ii) Instead of connecting the external aerial directly to the tuned circuit, connect one lead to a 220-pF capacitor, and the other end of the capacitor circuit to the 'hot' end of the tuned circuit (C1 in Fig. 3.5).

(iii) Instead of connecting the external aerial to the tuned circuit, connect to the tapping point of the coil (tag to which the diode is also connected). Try a direct connection, and also connecting in a 220-pF capacitor.

* Tune to an AM broadcast station near the lower end of the dial—close to 550 kHz.

(iv) Try connecting a 1.2-k resistor (or higher value) across the phone connection (R in Fig. 3.5). You may be using the wrong type of phones or earpiece, which do not provide a proper load or complete the circuit.

If there is a complete lack of response, check for faulty wiring-up. A more likely cause, however, is lack of an external aerial or earth connection in an area where these are strictly necessary for adequate reception; or an inefficient aerial (too short) or poor earth connection (bad electrical contact to a good earth point, or connection to a bad earth point).

Another possible cause of apparent failure may be too much outside noise entering the ear so that it is impossible to detect the very weak radio signal as it is being tuned in. Headphones are better than a single deaf-aid type of earpiece in this respect but, in any case, a really quiet room is virtually essential for initial setting up and tuning adjustments. Also, if your adjustment of the tuning control is too coarse, you may completely miss the setting for the station you are looking for, without realizing it.

Reception will also tend to vary with weather conditions. Some days it may be so poor that what was normally a strong station is hardly heard at all. The simple basic receiver has many limitations but, since it costs very little to construct and nothing at all to operate, this must be regarded as inevitable.

Providing you can hear something—even if too weak a signal to distinguish properly—you can certainly improve the performance of your basic set by further experimentation with tuned circuits (see Chapter 4) and/or the addition of amplification to the circuit. You can also try other types of basic crystal set, as described in the following projects.

Circuit 2 (Fig. 3.6) is identical to *Circuit 1* except that, instead of a diode, a transistor is used as a detector. Only two of the transistor leads are connected—the emitter (*e*) connection to the tapping part of the coil, and the base (*b*) to the 'earthy' end of the circuit. The collector lead of the transistor is ignored (bend it out of the way so that it cannot accidentally short out the other leads).

You can try almost any type of low-cost AF transistor; recommended types are OC42, 2N370, 2N2925, 2N5088.

With the addition of two more components, Circuit 2 can be modified to work the transistor both as a detector and an amplifier, to give stronger signals through the headphones. Using the same transistor type

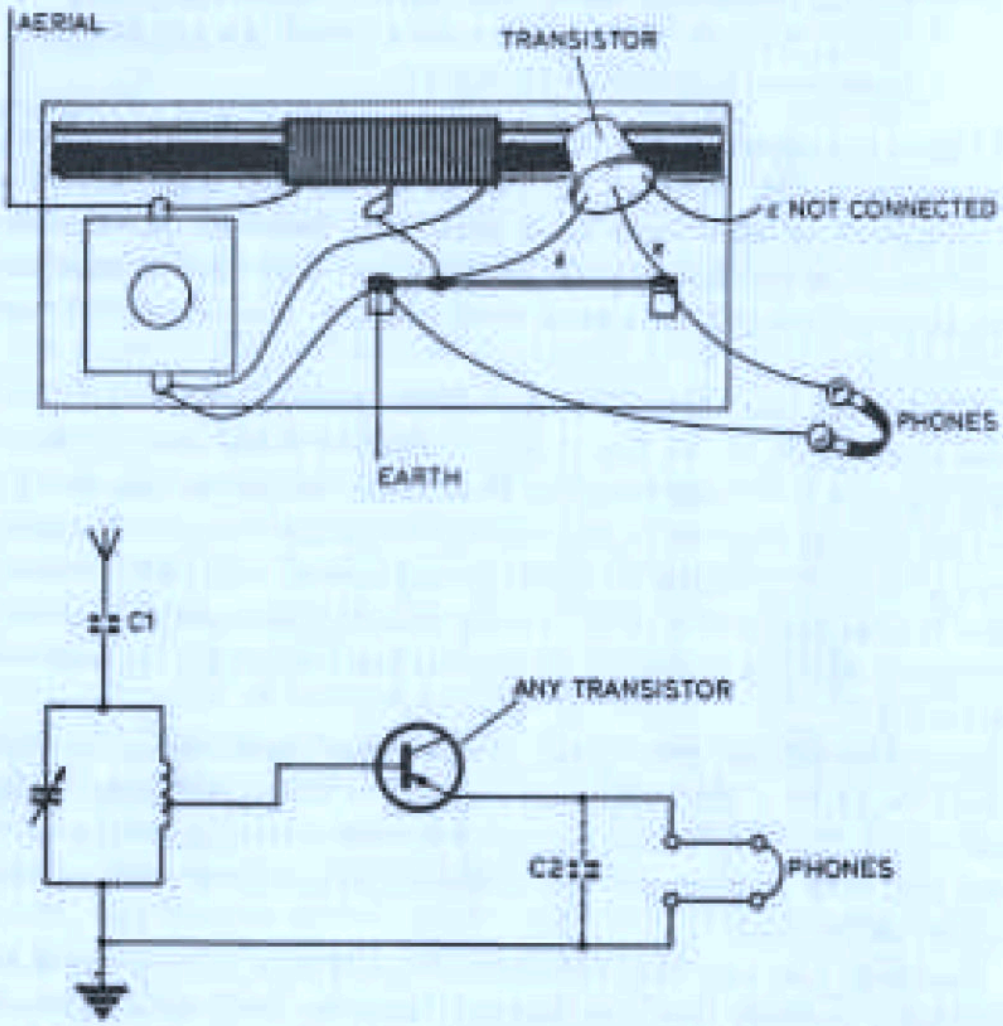


Fig. 3.6 *Circuit 2.* Crystal set using transistor instead of a diode.

as above (or near-equivalent) resistor R should be 15 k and capacitor C3 1 μF or higher.

This time a battery is also required to supply power for the transistor to work as an amplifier. This can be from 1.5 V up to 9 V. Remember the rules for polarity of connection: those shown in Fig. 3.7 are for a p-n-p transistor; an n-p-n transistor would need the battery connected the opposite way round. Battery polarity also affects the connections of capacitor C3 (if an electrolytic or polarized type).

Experiment further by trying the effect of using additional capacitors in the circuit, e.g. C1, 220 pF; C2, 0.001 μF (try other values as well); C4, 0.001 μF (try other values as well).

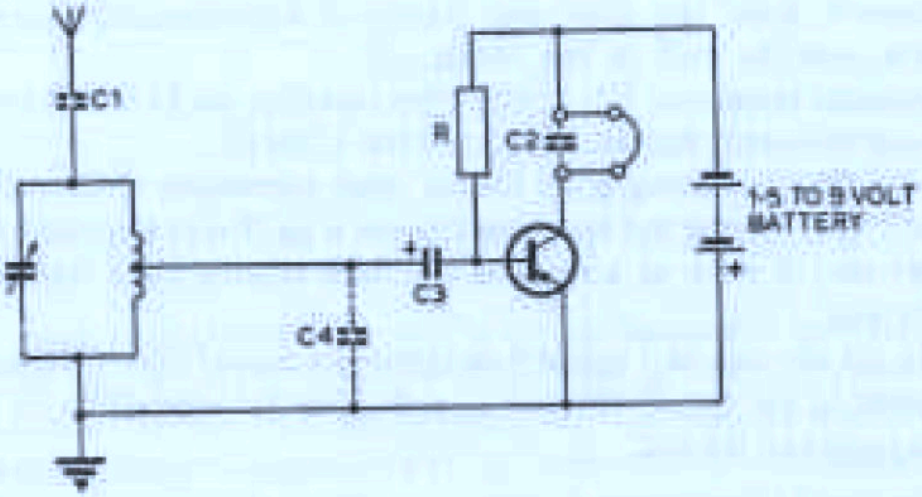


Fig. 3.7 *Circuit 3.* Crystal set with amplification.

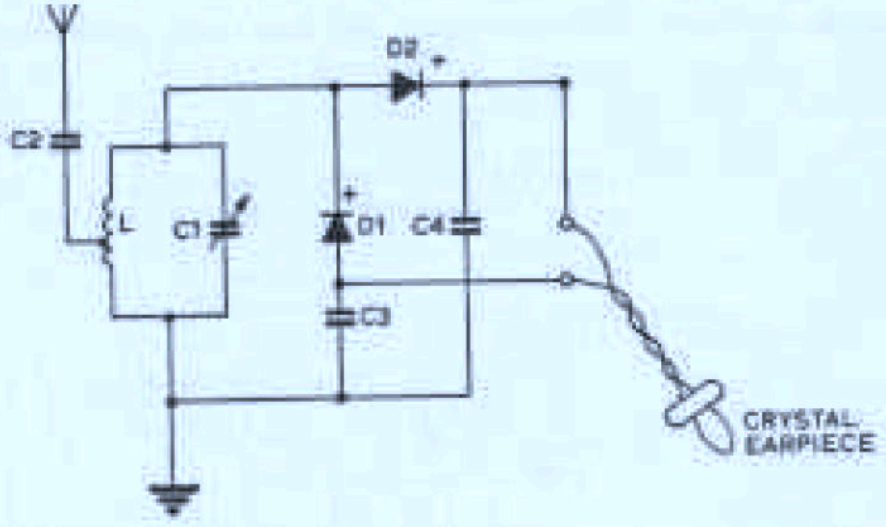


Fig. 3.8 *Circuit 4.* Double diode crystal set.

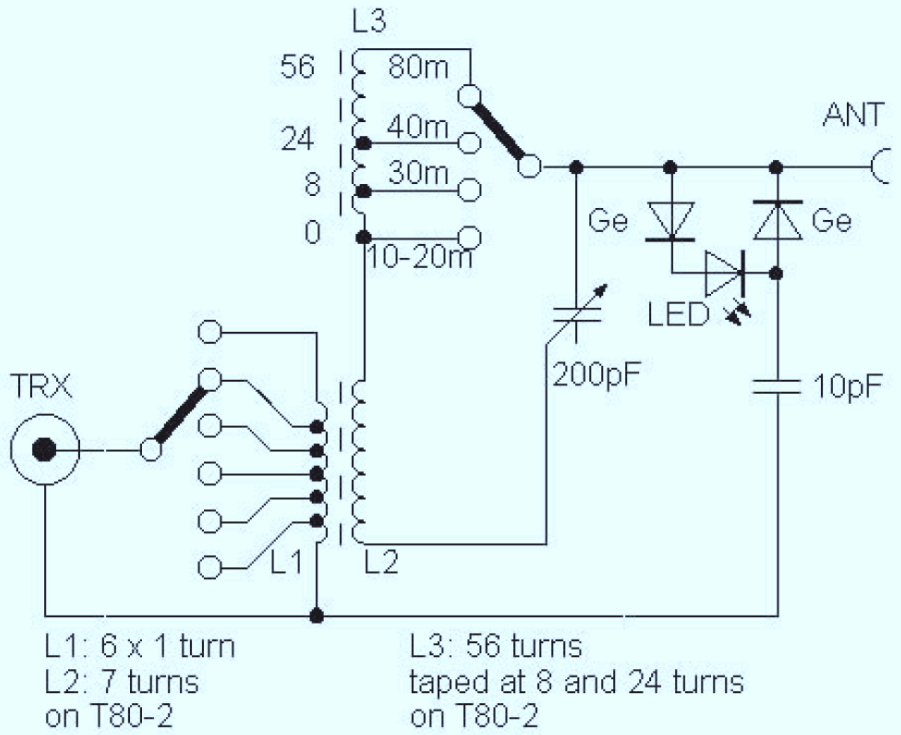
This circuit incorporates 'voltage doubling' to improve the signal volume and should give better performance than a single diode circuit. L and C1 are the usual tuned circuit, but an unusual feature is that the *aerial* is connected to the coil tapping point. Any type of germanium diodes can be used (they should preferably be the same), making sure to connect them the right way round. A high-impedance *crystal* earpiece must be used in this circuit.

Capacitor values are: C2, 220 pF (this capacitor can be omitted—try with and without in the circuit); C3 and C4, 1,000 pF.

The optimum tapping point for the aerial connection to the coil L is best found by trial and error (see Chapter 4 on 'Tuned Circuits'), but the set should work at a nominal one-third tapping point from the 'earthy' end.

This set can also be tried with conventional tuned-circuit coupling—i.e. aerial to the top of the coil L, and diode D2 connection to the tapping point on the coil.

The Fuchs Antenna was introduced by Arwed Fuchs, an Austrian Radio Amateur in 1928. It was used as a high efficiency single band half-wave endfed antenna by many radio amateurs over a long period, but it was more or less forgotten when most radio amateurs started using coax-fed dipoles. In the 80s, some Swiss OMs rediscovered the Fuchs Antenna Tuner, especially for portable use. In 2000, Frank, DL7AQT, did lots of experiments with the Fuchs, and was happy to end up with a multiband version for portable use. QRPproject is now proud to make the Fuchs Antenna Tuner available as a kit. It is based on Franks' design with some small modifications we made because the variable used by Frank is no longer available.



The QRPproject Multiband Fuchs
is basically a half wave antenna. It can be used with good results at the original frequency and also at all harmonics. It is fed by a parallel circuit with inductive coupling. Tables 1 and 2 show the optimal length of a wire from 1 half-wave at 80m to 8 half-waves at 10m. As you can see, the length increases from 80 to 10m. This is because the velocity factor of 0.96 is only exact at the ends of a wire antenna. If a wire antenna is longer then 1 half-wave, the middle part must be calculated using a velocity factor of 1. In practical use, we found that the Fuchs circuit easily compensates for this difference. When the total length is a multiple of a halfwave +/- 5 %, we found no difference. As you can see, a wire length of about 21 meters makes a good antenna for 40m and higher.

Tabelle 1

Frequenz (MHz)	Halbwellen	Drahtlänge (m)
3,55	1	40,14
7,025	2	41,64
10,125	3	43,70
14,05	4	42,17
18,08	5	41,07
21,05	6	42,40
24,9	7	41,87
28,05	8	42,51

QRG	Lambda/2	Drahtlänge
7	1	20,28
14	2	20,82
21	3	21,02
28	4	21,12

During his experiments, Frank used two different designs. For the upper bands only, it was ok to use one Amidon T80-2, but this design did not work if he tried to use it from 80 to 10 meters. Some tests in the QRPproject lab using our HP Network analyzer showed that there are some extra points of resonance in the 18 MHz range. We assume that they are caused by the unused section of the core in interaction with stray capacitance. Winding the complete Fuchs circuit on TWO toroids solved the problem. There are still unwanted resonance frequencies, but they now are in the 60 MHz range, and without any influence when we tune a SW antenna.
Due to a lot of questions:
NO, there is now ground connection missing at L2!! This is part of the genious Fuchs design :-)

LED RF Indicator
The simple LED RF indicator detects the voltage at the feedpoint of the

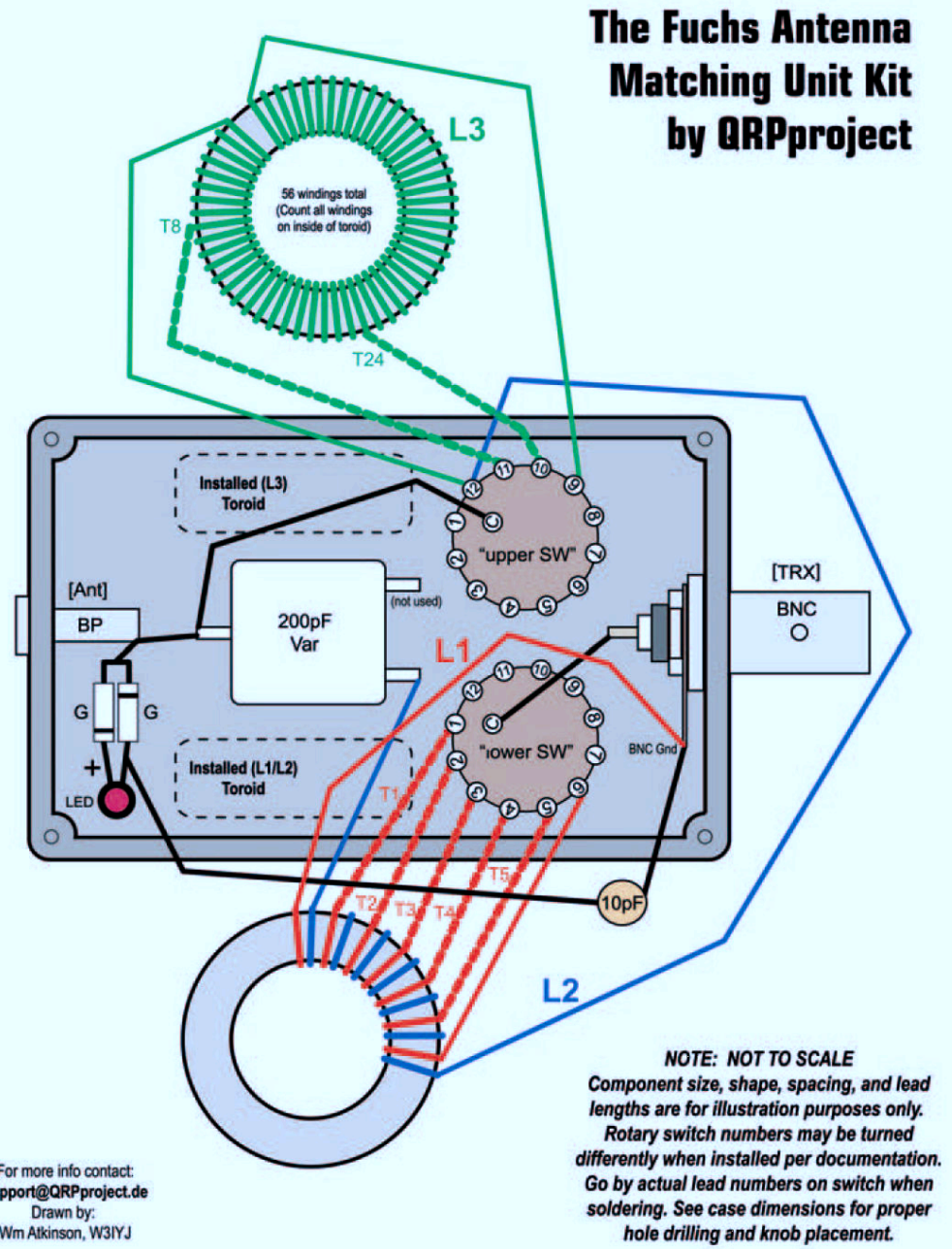
antenna. While tuning the Fuchs circuit, when the RF voltage at this point has its highest value, the antenna is exactly in resonance, and antenna coupling of the transmitter is at its optimum.

Practical experience

The Fuchs circuit was built into a 70mm x 50mm x 25 mm plastic enclosure. We used a BNC jack for the transceiver input and a banana jack for the antenna connection. It is very easy to tune. The first step is to tune the variable capacitor to loudest noise or signal in receive mode. You must switch the main coil taps to get the best result. The point of resonance is very small, so you will hear the difference between resonance and non-resonance very clearly. Usually you will find resonance at two different taps of the main coil. If so, use the one with the better L/C ratio (more L = higher Q). Now hit the transmit key in CW or a tune knob to get a transmit signal. Switch the coupling section of the Fuchs circuit to get the brightest signal at the LED RF Detector (or lowest SWR if your transmitter has a built in SWR Meter).

Parts list of the QRPproject 80-10-FUCHS kit

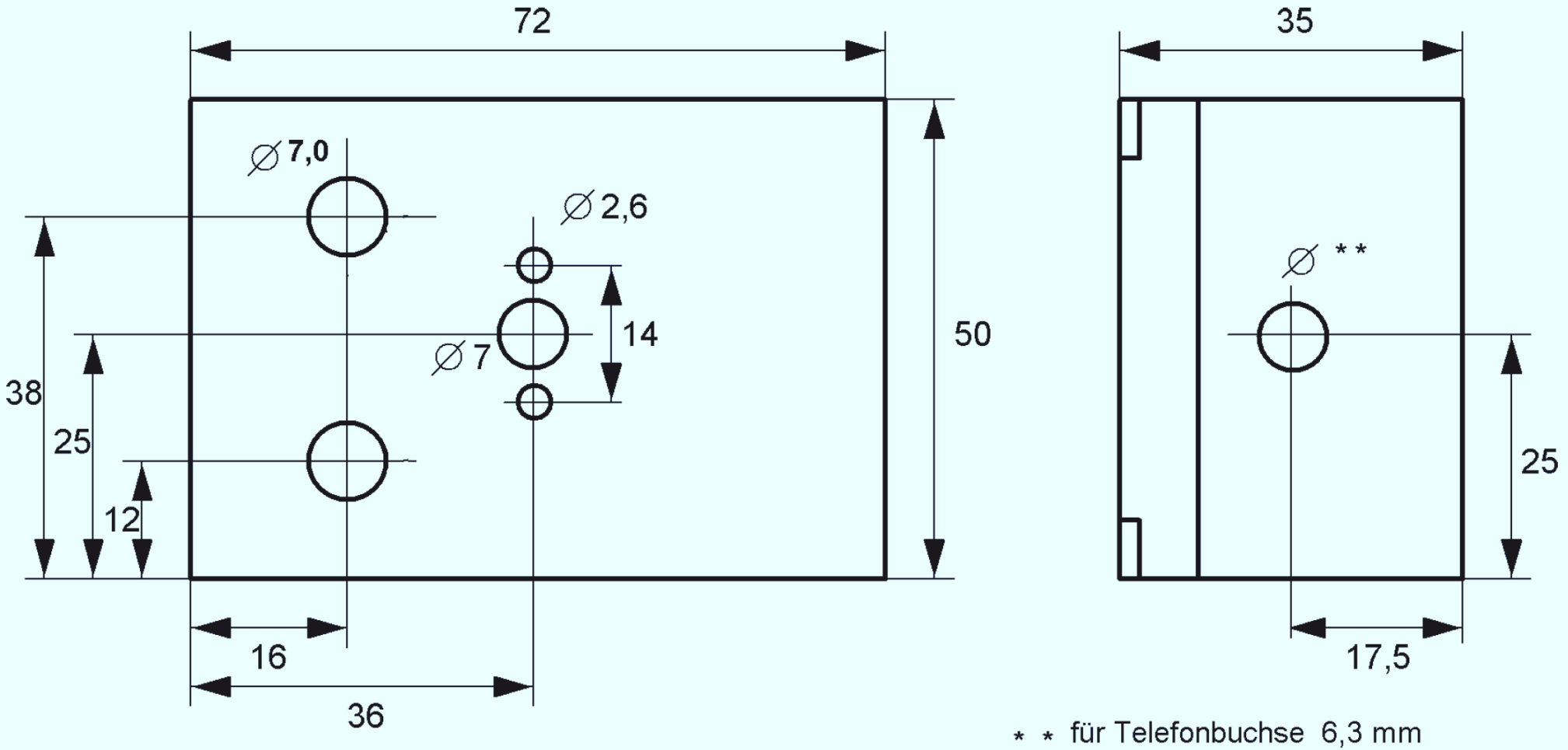
1 enclosure
1 variable cap
2 Amidon Toroid T80-2
2 Miniature switch 1x12
1 Banana jack
1 BNC jack
2 Germanium Diode
1 LED
3 Knobs
Enameled wire 0,5mm
Ceramic capacitor 10pF
1 manual



Attention: starting July 2008 we use another type of switch. It´s smaller and the common conector is placed exactly in the middle of the switch.

†1. Preparing the enclosure

Drill all holes as shown in the drawing. All distances refer to the outer side of the enclosure. The diameter of the holes are taken from the diameter of the provided parts. The BNC jack and the Banana jack



* * für Telefonbuchse 6,3 mm

* * für BNC-Buchse 8,5 mm

3. solder all remaining solder-points:
Solder a wire between the middle pin of the lower rotary switch to the inner pin of the BNC jack. Solder another wire between the middle pin of the upper rotary switch to the rotor of the variable capacitor, and another short wire from the rotor to the banana jack. The only remaining thing now is the LED RF-Indicator.

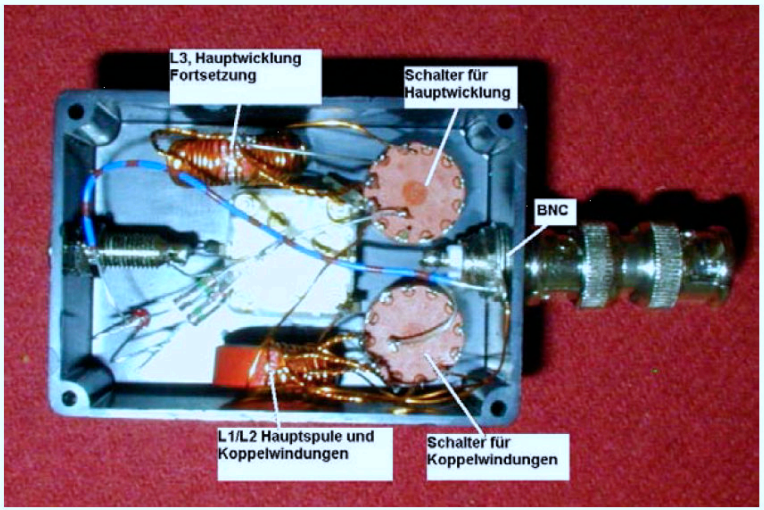
Drill a hole for the LED somewhere in the top of the box, near the banana jack. Solder the cathode of one germanium diode and the cathode of the other Ge diode to the banana jack. The other side of both diodes must be soldered to the LED: (Ge-cathode to LED anode, and Ge-anode to LED cathode.) The cathode of the LED must be connected to BNC ground using a piece of wire and the 10pF ceramic cap.

That's all! The Fuchs circuit is now ready to use.
Remark:
By practical use we found that the Diodes plus the LED may cause intermodulation to your RX especially at winter evenings at 40m when using long antennas. If you run into this problem, remove the 10pF cap connected between the LED and ground. The LED will still work as an indicator, picking up energy by stray capacitance. It will not glow as strong as before but still enough to work as an indicator. Give it a try.

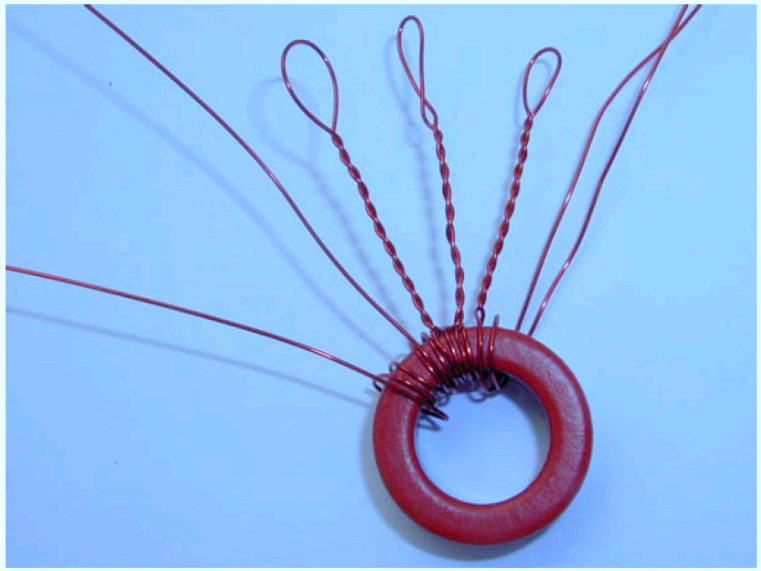
Start operating:

Connect the Fuchs using the BNC:BNC connector to your transceiver. Use a 41meter (or 21 meter) long antenna wire, connect it to the banana jack,and switch the receiver on.
At first, choose the coupling factor by switching the lower rotary switch. For 10 and 12 meters, this will probably be 1 turn; for 15, 17 and 20M, 2-3 turns; for 30 and 40M, 3-4 turns; and for 80M, 4-6 turns. Now adjust the main windings using the upper rotary switch and the variable cap. Start with the switch at its lowest position and rotate the variable cap. If you have chosen the right tap of the main winding, you will find a dramatic increase of noise if the capacitor has the right value to resonate. If there is no point of resonance, try the next tap. If the circuit is in resonance, key the transmitter and adjust the coupling for best SWR (brightest LED).
This procedure seems to be complicated, but you will find, that it is very reproducible. So, in the future, you only have to remember which tap to use for which band, and tuning will be very fast. I hope you will enjoy your Fuchs antenna tuner! It's an excellent choice for portable use, because you will need only one port, and because it is a high efficiency tuner with very low loss.

Peter, DL2FI
If you have any questions or suggestions, please send me an e-mail, or phone: Support@QRPproject.de / +49 30 859 61 323



must be placed exactly in the middle of the front and back (short) sides, as shown on the pictures.



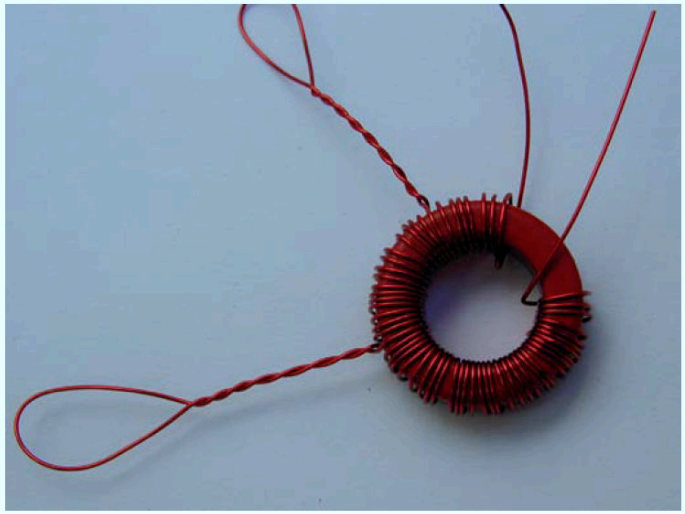
2. Winding the Toroids

L2/L1

Attentention, the pictures do not show the exact number of turns.

Remember that turns on a toroid are always counted at the inner side of the ring. Start with 7 Turns for L2. Don't spread the 7 turns over the ring, but keep the turns close together at the inner side of the ring. Leave about 6cm at both ends of L1. Now, wind L1 (the coupling winding) between L2. For these to be in phase, lay the wire for L1 parallel to the L2 wire and start at the same point, where L2 starts. Do one turn through the Ring, and then form a loop (abt 3cm diameter) and twist the loop as shown in the photo. (ATTENTION, photo does not show all windings) Do the next five turns, forming such a loop after every turn.

To see how long the twisted loops must be, put the toroid at its place just below the lower 1x2 switch (BNC right sided, banana left sided, as shown in the photo). Bend all wires to their places, and cut them to the desired length. The beginning of L2 goes to the stator of the variable cap, end of L2 to the Pin 12 of the upper rotary switch. The starting point of L1 goes to BNC Ground, first tap to Pin 1 of the lower rotary switch, second tap to pin 2, third tap to pin 3, and so on; all taps and the end of L1 to the lower rotary switch. Next step is to tin all the wire ends. We prefere the „BLOB" method. What is the BLOB method? Using a hot soldering iron, melt a drop of solder at the end of the tip and hold it to the wire you would like to tin. Wait until the coating of the wire starts melting. You will see and smell some smoke. Don't breathe the smoke; it's not very healthy! When the coating starts melting, move the solder „BLOB" back and forth. The result will be a nice tin coating at the end of the wire. Check to see if the tin is all around the wire. If not, do the same procedure again. When all the ends and taps are tinned, solder L1/L2 to the 1st place, as described.



Next prepare L3

Take the other T80-2 toroid. Wind 8 turns and form a 4-5cm loop as you did for L1. Wind the next 16 turns in the same direction, giving you a total of 24 and form a second loop. Now, wind another 32 turns(total of 56) Now, place the toroid above the upper rotary switch, and prepare the wires. The beginning of L3 leads to Pin 12 (junction to L1), the first tap (turn 8) leads to Pin 11, second tap (Turn 32) to PIN 10, and the end of L3 to pin 9. Again, coat the wire ends with Tin, and solder them to their places.

The FUCHS Antenna got its name from the Austrian Radio Amateur FUCHS, who first described it in 1928. It was a monoband endfed half wave dipole.

The length of the antenna wire should be a Lambda/2 or a multiple of it. For 3,5 MHz you need about 41 meters.

With the FUCHS Network it is possible to use a 41 meter wire on all bands between 10m and 80m.

Tabelle 1

Frequenz (MHz)	Halbwellen	Drahtlänge (m)
3,55	1	40,14
7,025	2	41,64
10,125	3	43,70
14,05	4	42,17
18,08	5	41,07
21,05	6	42,40
24,9	7	41,87
28,05	8	42,51

Table 1 shows the length of wire we need for a given number of half wavelengths per band.

For 10m through 40m use a 21m wire.
For 10m through 80m use a 41m wire.

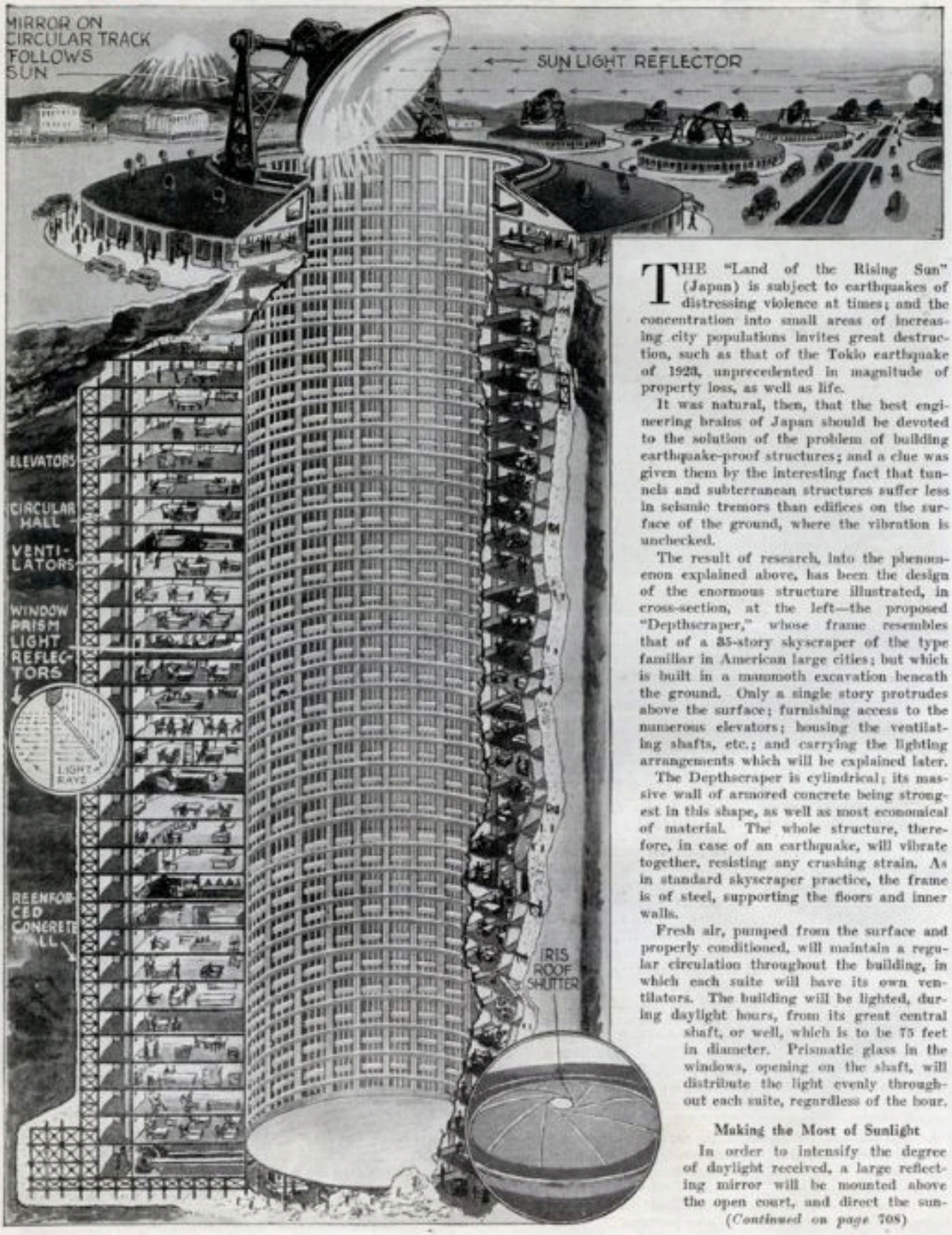
The QRPproject FUCHS Antenna

The network fits into a 70mm x 50mm x 25mm plastic enclosure. A BNC plug plus a BNC to BNC connector gives use the flexibility to use it with any rig which has a BNC antenna jack. Tuning is very easy. The first step is, to find the point of maximum noise / loudest signal in receive. Now with a small transmitter signal, the link is switched to lowest SWR. Ready. The FUCHS is equipped with an output indicator. Only at the point of resonance does the LED glow.

Parts list of the QRPproject Fuchs 80-10 kit

1 Enclosure
1 Variable capacitor (Poly Varicon) 340 pF
2 Amidon Torroid T80-2
2 Miniature 1x12 switch
1 Banana jack
1 BNC jack
2 GermaniumDiode (1N34)
1 LED
3 Knobs
3m enameled wire (24 AWG)
1 BNC<> BNC connector

"Depthscrapers" Defy Earthquakes



THE "Land of the Rising Sun" (Japan) is subject to earthquakes of distressing violence at times; and the concentration into small areas of increasing city populations invites great destruction, such as that of the Tokio earthquake of 1923, unprecedented in magnitude of property loss, as well as life.

It was natural, then, that the best engineering brains of Japan should be devoted to the solution of the problem of building earthquake-proof structures; and a clue was given them by the interesting fact that tunnels and subterranean structures suffer less in seismic tremors than edifices on the surface of the ground, where the vibration is unchecked.

The result of research, into the phenomenon explained above, has been the design of the enormous structure illustrated, in cross-section, at the left—the proposed "Depthscraper," whose frame resembles that of a 35-story skyscraper of the type familiar in American large cities; but which is built in a mammoth excavation beneath the ground. Only a single story protrudes above the surface; furnishing access to the numerous elevators; housing the ventilating shafts, etc.; and carrying the lighting arrangements which will be explained later.

The Depthscraper is cylindrical; its massive wall of armored concrete being strongest in this shape, as well as most economical of material. The whole structure, therefore, in case of an earthquake, will vibrate together, resisting any crushing strain. As in standard skyscraper practice, the frame is of steel, supporting the floors and inner walls.

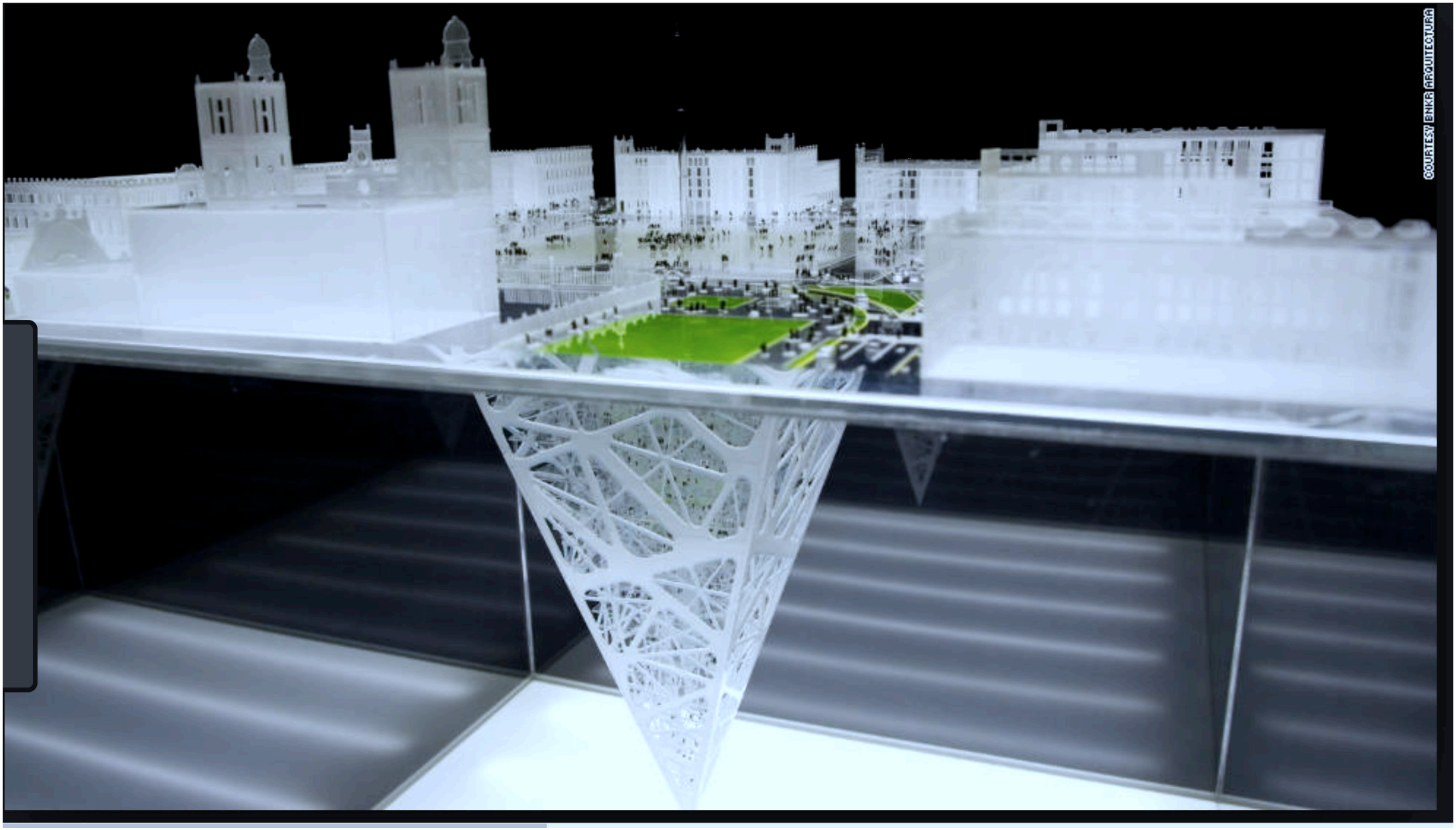
Fresh air, pumped from the surface and properly conditioned, will maintain a regular circulation throughout the building, in which each suite will have its own ventilators. The building will be lighted, during daylight hours, from its great central shaft, or well, which is to be 75 feet in diameter. Prismatic glass in the windows, opening on the shaft, will distribute the light evenly throughout each suite, regardless of the hour.

Making the Most of Sunlight

In order to intensify the degree of daylight received, a large reflecting mirror will be mounted above the open court, and direct the sun-

(*Continued on page 708*)

SHANGHAI EARTHSCRAPER "DEPTHSCRAPER"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GLEASON'S

NEW STANDARD MAP OF THE WORLD

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J. S. CHRISTOPHER, BLACKHEATH, ENGLAND. PRACTICALLY CORRECT.

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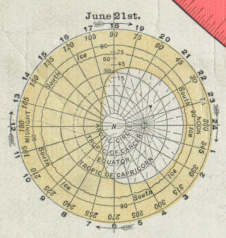
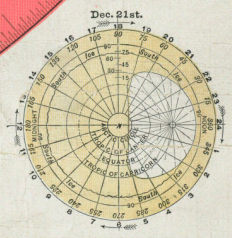


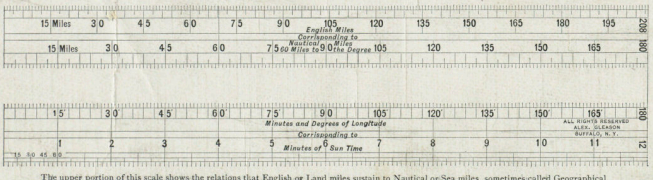
JUNE SOLSTICE.

IN the figures June and December, the white represents the Sun's position in his respective months, at Noon. This shows sunlight inside the Arctic Circle for 24 hours. From June 21st, the Sun moves round the Tropics in a spiral circle, widening every day, until it reaches its destiny on the southern or outer Solstice, on December 21st.



DECEMBER SOLSTICE.

ON December 21st, the Sun moves round the Tropic of Capricorn, and during the day lights up the southern portion of the Earth from the Arctic Circle to some portion of Antarctic ice. There is no "sunlight" beyond 80° south, but unknown regions of ice. On the 23d of December, the Sun commences his northward journey again, returning to his starting place, and thus completes his seasons.



The upper portion of this scale shows the relations that English or Land miles sustain to Nautical or Sea miles, sometimes called Geographical. The lower half shows minutes and degrees of the arc as compared to Sun time. By laying a straight-edge across the scale, it shows the relations of all the divisions.

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Map 77.3
Map 10.4.1892
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The New Wilkie D. Ferguson Federal Courthouse:

A new Federal Courthouse set to open this summer in downtown Miami will contain approximately 303,500 occupied square feet and approximately 557,000 gross square feet. The project includes 16 district courtrooms and chambers along with space for the Clerk of the Court, Grand Jury Suites, Pre-trial Services, the U.S. Marshals Service office, Marshal Service sally port with secure corridors and detention cells; automated data processing area for probation, the U.S. Attorney and GSA Operational/Joint Use space for conference/training rooms; loading dock, trash and recycling rooms, mail room, dock office, security/fire life safety office, and storage space. The project includes a tunnel connector link to the existing Federal Court complex and 110 secure indoor parking spaces. HVAC Associates Manufacturer, American Warming and Ventilating, furnished much of the HVAC product.

Buildings on local base still look like s...

KFMB

SAN DIEGO (CBS 8) - A multi-million dollar renovation on a naval building in Coronado, which some said is shaped like a swastika, is now complete.

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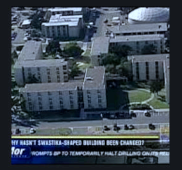
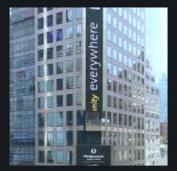
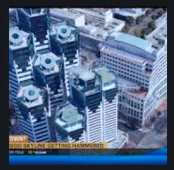
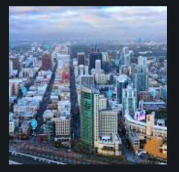
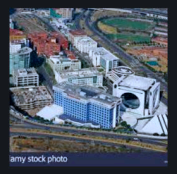
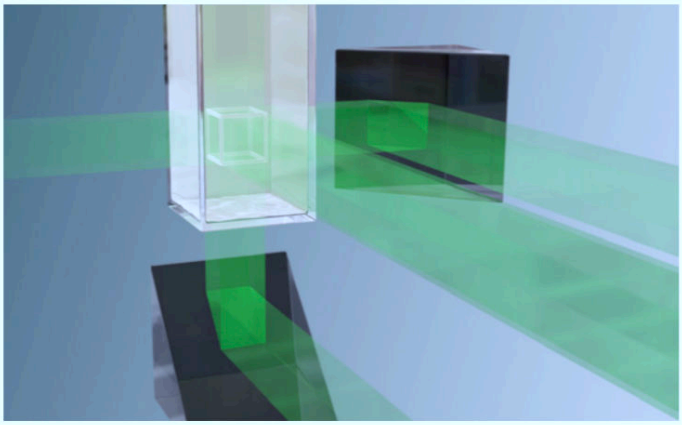







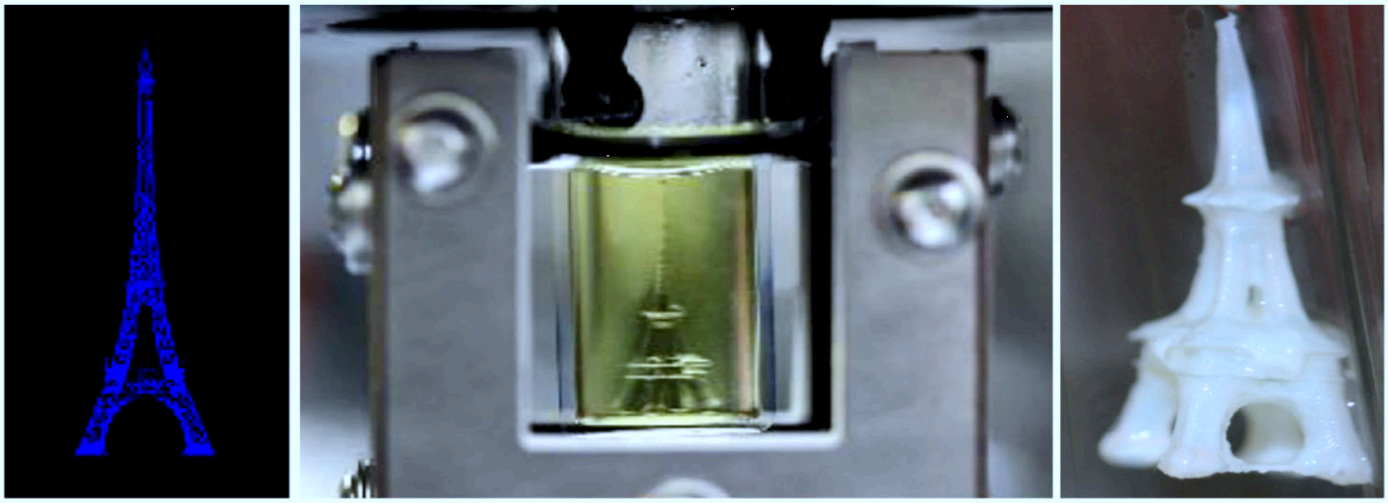
SET hundreds of years in the future, *Star Trek* depicts crew members wielding flip-to-open communicators to make surface-to-ship calls and using a replicator to instantly materialize food or spare parts. In the real-life present, smartphones have already outpaced those fictional communicators in many ways, and now we are on the verge of achieving another final-frontier technology, one capable of creating three-dimensional (3D) objects all at once rather than one piece at a time.

Researchers at Lawrence Livermore, in collaboration with the Massachusetts Institute of Technology, the University of California (UC) at Berkeley, and the University of Rochester, have invented two methods of volumetric lithography—using light beams to fabricate complex 3D polymer structures in one go instead of building them gradually. Livermore microtechnology engineer Maxim Shusteff says, "We wanted to explore how to make a 3D part all at once, and we decided that the easiest way would be to use light and some transparent medium. Immediately 3D holograms came to mind. Could we generate a hologram in a photosensitive material, so that the hologram cures into a physical object?" With the Laboratory's holographic and computed axial lithography technologies—both developed with support from the Laboratory Directed Research and Development (LDRD) Program—the answer appears to be yes.

These new processes are set to energize the realm of additive manufacturing—also known as 3D printing—by combining it with lithography, which is already widely used to make microchips using photosensitive materials. In traditional 3D printing, parts are constructed layer by layer using a point source, such as a nozzle or a focused laser beam that moves back and forth across a surface to deposit or melt material in a desired pattern. In such printing approaches, an entire two-dimensional (2D) layer may be patterned all at once. However, these techniques all have drawbacks. Shusteff explains, "The layer-by-layer approach is slow. For example, if your part has a hundred layers and each layer takes a minute to print, then the part takes almost two hours to complete. In addition, the resulting parts can have zigzagging edges. This roughness is almost always undesirable. Furthermore, unsupported structures or



A simulation depicts holographic lithography, which begins by creating a three-dimensional (3D) hologram of the object to fabricate. A laser beam is patterned by a spatial light modulator and split into three image projection beams (green), each representing a different view of the object. Prism mirrors direct beams into a chamber containing light-sensitive resin. The resin cures wherever the three beams intersect, forming the object.



Using computed axial lithography, a 3D model of the Eiffel Tower is formed. (left) Each video frame shows the shape from a slightly different perspective. (middle) Inside a rotating chamber, the beam reacts with light-sensitive resin, which begins to harden. (right) After about 2 minutes of exposure, the resin solidifies into the 3D part.

disconnected islands of material that will later connect to another layer by an overhang or a span cannot be formed layer by layer. Our new approach of creating objects in 3D all at once overcomes these limitations."

Holographic Lithography

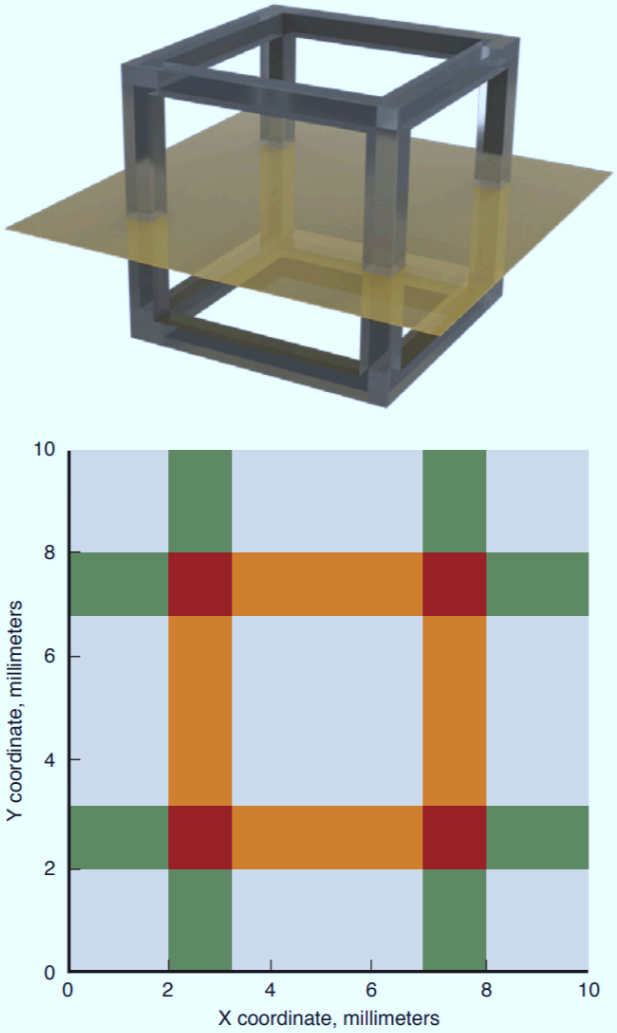
In holographic lithography, the first step is to generate a hologram of the object. Next, the hologram is broken down into three projections each representing a different orthogonal view, usually front-to-back, right-to-left, and top-to-bottom. A diode laser generates a 532-nanometer primary beam with a power of 5 to 50 milliwatts, and the beam is widened by passing through an array of optical components. After striking a spatial light modulator—an array of liquid crystal pixels on a silicon surface—the beam is patterned into the three projections spaced apart from each other inside the beam and which together comprise the single 3D image.

Refined by additional optics, the projected image overlaps two prism mirrors and a glass chamber, which contains a resin made of a photopolymer—polyethylene glycol diacrylate—with a small amount of photoinitiator. Two of the three composite image segments are directed by the mirrors into the chamber at right angles while the third projection shines head-on into the chamber. As these beams perpendicularly intersect in the chamber, the free-floating 3D structure forms in the resin as its photopolymer absorbs the light energy. A single exposure lasts only 1 to 20 seconds. Objects up to a few millimeters in size have already been successfully fabricated.

Superposition and Materialization

The absorption of light energy by the photoinitiator causes free-radical polymerization, a chemical reaction in which photopolymer molecules grow and link together. As the molecules interconnect by crosslinking, the material first achieves a gelatinous state and then finally cures into a 3D solid. In the case of a cubic lattice, for example, each projection beam has a cross-sectional shape like a square with thick sides and passes through the entire volume of resin like a square cylinder. Overlapping of the separate projections is called superposition, and at these spots the light is two to three times stronger than that of a single projection beam. The greater the intensity of light, the faster the curing occurs. Where all three projection beams converge to produce the maximum amount of light energy is where the object forms as the light energy exceeds the photopolymer's dose threshold and crosslinking occurs. If three-beam superposition does not occur, the resin does not fully cure because the threshold is not exceeded.

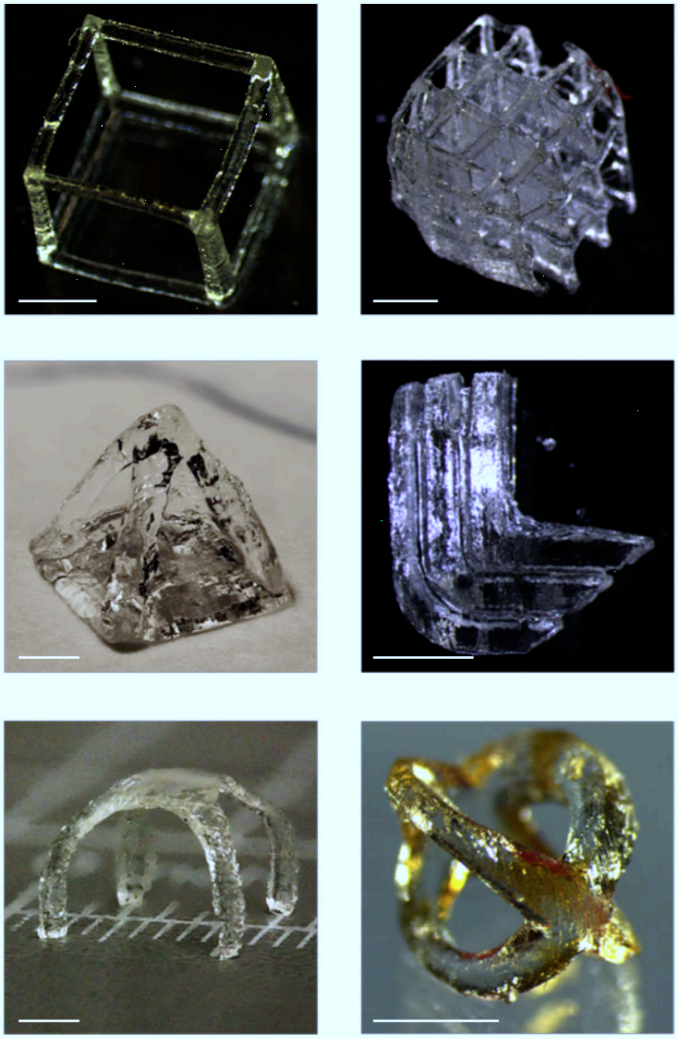
Shusteff adds, "Part of the LDRD study was to determine where exposure should occur, how long exposure should last, how much light to use, what concentration of photosensitive material can achieve the desired curing rate, and how to assess the degree of curing. In short, a timing game is played. For example, if exposure is too long, the structure overcures, and resin outside of the three-beam intersections also starts to solidify."



(top) A cubic lattice is shown as an example of a 3D object that can be formed by holographic lithography. The plane marks the cross section shown in the bottom image. (bottom) The relative intensity of light in the projection beams for the cross section is shown. Intensity increases with the number of beams intersecting—three beams (dark red), two beams (orange), one beam (green), and no beams (beige).

Computed Axial Lithography

Forming hologram projections with a spatial light modulator is a complex, demanding process. The laser must be stringently aligned by many optical components, including multiple lenses and filters.



Photos show some of the hundreds of objects successfully fabricated with holographic lithography. The cubic lattice from the previous figure is shown in the top left. Each scale bar represents 2 millimeters.

Measurements are also required to control speckle, that is, noise from the interference of coherent light. Shusteff describes another challenge: "The projection beams are basically like extrusions or collimated light and so cannot have features in the depth dimension. This characteristic imposes geometrical limitations on what structures can be made. To investigate the true limitations of geometric shapes, we developed an outgrowth project." That investigation of possible geometries entailed asking whether the three projection beams could be aimed in other directions, not only perpendicular to one another. The team turned their attention to nonholographic projections and developed a method called computed axial lithography (CAL), which is a similar to the computed tomography used in medical applications but uses visible light instead of x rays. Brett Kelly, a graduate student from UC Berkeley, spearheads this effort at Livermore.

In CAL, the system generates a video portraying the complete rotation of projections of the 3D object to be fabricated. Kelly explains, "Instead of using three images, we use a sequence of 1,440 images, or 4 per degree of rotation." For roughly 1 to 3 minutes, the video images travel through a lens and into a resin chamber whose rotation rate is synchronized with the video frame rate. Each image is a different 2D pattern of light and enters the resin from a different angle. Inside the resin, the light intensity increases through superposition. Kelly adds, "By summing up all these carefully designed images, we create a distributed 3D energy dose inside the resin. With multiple rotations, the dose becomes sufficient to cure desired regions while leaving undesired regions in liquid form." The resin used is more viscous than that in holographic lithography, but the same crosslinking process forms structures on the centimeter scale. The structures cure upon completing up to three full rotations. Because CAL uses time-multiplexed images and a weaker light source—requiring more time for the dose to exceed the photopolymer's light energy threshold—build rates are currently slower than those of holographic lithography. However, holographic lithography's geometric constraints of are overcome.

Shusteff sees holographic lithography and CAL as complementary. "We may not always be able to fabricate a part by spinning it around in CAL or not always have access to all sides to use holographic lithography. However, the chances are we can make any structure using one technique or the other or some combination of both." The researchers are now eagerly looking to further push the boundaries of these technologies. What other materials can be used? Can the size of a shape be scaled up and down? How can the resolution be improved? What other limitations are out there? Determined work will answer these questions. Says Shusteff, "These are certainly the directions in which we hope to take this promising technology in the future."

—Dan Linehan

Key Words: additive manufacturing, computed axial lithography (CAL), holographic lithography, Laboratory Directed Research and Development (LDRD) Program, laser, photopolymer, spatial light modulator (SLM), superposition, three-dimensional (3D) printing, tomography.

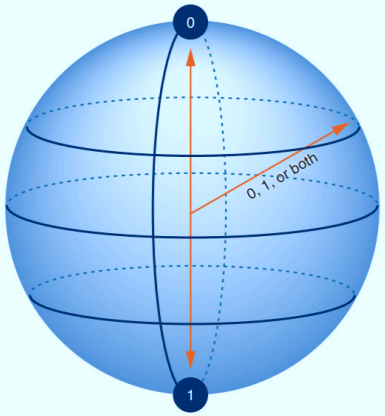
For further information contact Maxim Shusteff (925)423-0733 (shusteff1@llnl.gov,).

Ongoing activities include demonstrating a fully programmable quantum computing system, improving superconducting materials and devices, deploying quantum sensors, and developing quantum algorithms. Progress has been encouraging, with Livermore recently deploying two functional quantum computing test beds.

The Quantum Lexicon

At first glance, parallel computing systems such as Livermore's existing supercomputers may seem equivalent to quantum computers in that all perform multiple operations simultaneously. However, the key difference is in how the two fundamentally tackle computing problems. A classical computer uses on/off transistors to store and process information, encoding data in binary digits, or bits, in one of two states—0 or 1. In contrast, a quantum computer operates on the principles of quantum physics, storing data in quantum bits, or qubits (pronounced "cue-bits"). Livermore's qubits are superconducting electrical circuits that can exist in multiple simultaneous states—0, 1, or both. This principle of superposition is analogous to mathematically representing the state of a heads-or-tails coin flip whose outcome is still literally up in the air. The concept was first illustrated by Erwin Schrödinger's famous 1935 thought experiment wherein a hypothetical unobserved cat is both alive and dead—but found to be one or the other when observed.

Using qubits for computation increases processing power exponentially. Two qubits can store data in four states concurrently—00, 01, 10, and 11. A 64-qubit quantum processing unit (QPU) is equivalent to 2^{64} bits—16 exabits—in a classical computer. For any number (n) of qubits, a quantum computer could perform 2^n operations at the same time. A classical computer would take far longer to do so—in some cases, years compared to seconds. This promising leap in computing power is possible only if the superposition state can be precisely controlled to remain coherent. Otherwise, the qubit system can generate errors as it processes information simultaneously. Coherence requires preservation of the relationship between different quantum states so that superposition results, which in turn requires that changes to qubits can be reversed.



Superposition is a major principle in quantum physics, occurring when particles exist in multiple states. This phenomenon allows a single quantum bit, or qubit, to represent 0, 1, or both. In contrast, a bit in classical computing can only represent 0 or 1.

Prolonging coherence is the key to sustaining quantum calculations. The smallest changes in the environment surrounding a qubit can cause a loss of coherence, also called decoherence, so scientists are keen to reduce interference from electromagnetic waves, temperature variations, and other variables in and around quantum hardware. Quantum computing—and quantum-coherent devices in general—therefore requires both using precisely controlled low-energy pulses to sustain superposition states and preventing other energy sources from disturbing those states. "We are working at the opposite end of the energy spectrum from explosives or galactic events," explains Laboratory physicist Yaniv Rosen. "We are studying energies 100 million billion times fainter than the energy expended in a mosquito's flight, down to 20 microelectronvolts."

Decoherence and other system noise can be sources of error in quantum computing. In classical computing, error correction helps make systems fault-tolerant by ensuring reliable data delivery and reconstruction, and the viability of quantum computing also depends on achieving such goals. DuBois points out, "No one experimenting in this field has yet demonstrated successful error correction, which is analogous to break-even in nuclear fusion."

A Supercool Facility

A quantum computer does not look like a classical computer. Its refrigerator does not resemble a typical refrigeration unit, for instance. At Livermore, a quantum processor relies on superconductivity to reduce electrical resistance and interaction with the environment. The superconductive processor, consisting of particles in quantum circuits, is operated at extremely cold temperatures so that scientists can control the circuits' quantum states. This approach may offer the best chance of achieving coherence goals. The sophisticated cooling infrastructure recirculates helium-3 and -4 isotopes through layers of increasing coldness, reducing the interior temperature to –273.1°C (0.007 kelvin). The dilution refrigerator operates under vacuum and is electrically shielded to minimize heat leaks and environmental noise.

Qubits are seated inside the refrigerator and connected to a suite of electronics that control superposition with microwave pulses. An arbitrary waveform generator provides gigahertz frequencies and amplitudes to interact with the qubit, and an oscilloscope monitors the input signals. The results of these manipulations are sent to an analog-to-digital converter to verify signal fidelity, and the calculation results are read on a standard computer. Indeed, classical computing plays an important role in calibrating, running, and maintaining the Laboratory's quantum computing test beds. The Livermore team codes instructions for pulse shape and frequency in the Python programming language and uses HPC software to adjust designs for pulse control and other variables.

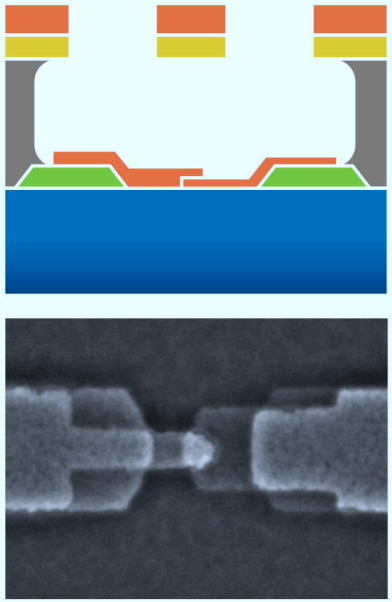
Although many of these components are available commercially, no instruction manual exists for a fully integrated quantum system. The team's hands-on experience and troubleshooting skills grow daily as they supply their own technical support. Eric Holland, Livermore's chief quantum systems architect, explains, "We are assembling quantum computing components in ways others have not. Livermore is blazing a trail." For example, the Laboratory's qubits are housed inside canisters attached to the bottom of the refrigerator. Made of gold-plated copper to prevent oxidation and maximize thermal contact in a vacuum, the cans are designed, built, and coated at the Laboratory before being sent offsite for annealing. Special shielding protects the qubits from stray magnetic fields and prevents light leaks. Each test bed holds four cans, allowing multiple experiments to run simultaneously.

This machinery is inherently fragile. Rosen says, "On paper, a quantum system design can seem perfect, but the environment really comes into play when implementing the design." However, DuBois cites the Laboratory's expertise in HPC, engineering, materials science, cryogenic physics, and quantum physics as

S&TR December 2018

Inside a test bed's dilution refrigerator, gold-plated cans contain qubits, which are connected by wires to the rest of the assembly. Recirculating helium progressively cools the structure from top to bottom, with each circular plate introducing a colder phase. (Photo by Carrie Martin.)

a potentially game-changing combination in solving the quantum computing puzzle. "Livermore's people have a well-defined vision of how to advance this field," he says. The Laboratory's two test beds are similarly assembled but serve different purposes—one for quick tests and prototyping and the other for mature experiments. The former was installed in late 2017, while the latter came online in early 2018 to support the ASCR Quantum-Enabled Simulation (AQuES) Testbed Pathfinder Program, which brings Lawrence Livermore and Lawrence Berkeley national laboratories together to pursue diverse research and development in quantum computing.



A Josephson junction is the key component of superconducting qubit circuitry. (top) The Laboratory's fabrication process, shown in side view, includes precisely controlled deposition of layered materials (green, orange, yellow) on a substrate (blue). (bottom) Scanning electron microscopy shows a top view of a complete Josephson junction after deposition.

Building Better Qubits

Livermore scientists are developing quantum computing components alongside a new class of superconducting materials for low-energy regimes. These efforts span qubit design, QPU configuration, quantum chip circuitry, and quantum materials science. (See *S&TR*, March 2016, pp. 17–19.) Holland explains, "The design space is ripe for exploration. Our internal investments allow us to question others' approaches." Classical computing advancements typically focus on planar chip design, and industry's prevailing quantum chip architecture is a two-dimensional (2D) lattice of qubits, each controlled by a separate oscillating signal input. However, both 2D and three-dimensional (3D) designs are being pursued at the Laboratory. DuBois states, "For better efficiency, we are trying to achieve the same computational power with one input port per system, not per qubit—a completely different paradigm for controlling the basic unit of a scalable quantum computer."

Furthermore, industry typically offers nearest-neighbor connections between qubits, which means lattice arrays increase as more neighbors per qubit are added, making the device less efficient as it grows in size. By the end of the 5-year AQuES Testbed Pathfinder Program, the Livermore team intends to stand up a working 20-qubit QPU with all-to-all connectivity—any pair or trio of qubits, and any combination of pairs or trios, will be interconnected. "This QPU size is the equivalent of a matrix of about a million squared, which is a good starting point for an HPC system to simulate," says Holland.

The team is experimenting with several designs for manufacturing and positioning qubits, all aimed at minimizing energy loss and error rates while maximizing performance. The Laboratory's qubits are based on Josephson junctions, in which two superconducting materials are connected by an insulating link. In an environment cooled nearly to absolute zero, this design allows current to flow between the superconductors with very little voltage applied. "Josephson junctions are the essential ingredient in superconducting QPUs," says Holland. Using electron-beam lithography and evaporation, Josephson junctions are created with overlapping layers of aluminum and oxidation coatings deposited onto a substrate.

An effort at design improvement combines qubits in a new configuration known as a "qudit." This highly efficient, multidimensional arrangement of qubits stores data in more than two states and with lower error rates. The larger the qudit, the more qubits it represents and the faster its calculation potential. A new, homegrown QPU design, nicknamed the quad core, begins with qubits fabricated on sapphire wafers, which are then cut into strips. Inside the high-purity aluminum core, a three-qubit strip is flanked by four qudits. This layout results in all-to-all connectivity.

Do-It-Yourself Materials

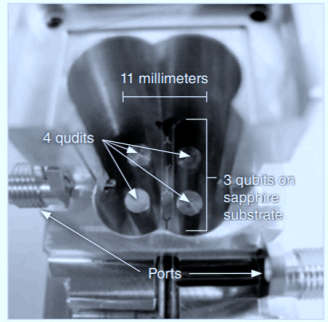
Beyond serving as the building blocks of quantum computing, qubits also help Livermore researchers probe low-energy and -temperature systems in general, which in turn helps the team build better qubits. Rosen explains, "Not many institutions are investigating materials development for quantum systems. While others try to improve construction, we also strive to understand the root of the problem, such as which material properties are affected by miniscule energy changes." For instance, Rosen studies surface defects, which behave completely differently from bulk defects. Disruption in surface-level energy is a potential source of decoherence in quantum circuits and qubits.

Livermore researchers are developing 2D quantum chips containing unique resonator geometries. A 2D resonator is a pattern of conductive material used to optimize oscillation signals, visually resembling a television antenna flattened onto a plane inside a microchip. The widths of each tine and the spaces between them affect electrical flow through the resonator. In recent experiments, Rosen used the Laboratory's quantum computing test beds to measure surface defects in superconducting aluminum resonators. The test bed's ultracold environment reduces electronic interference so that the team can track a single photon's passage through a resonator pattern. The longer the photon stays inside the resonator before "ringing down," the longer the coherence time. Rosen summarizes, "If we can store a photon indefinitely by controlling or mitigating surface defects, we can extend the quantum computing time limit."

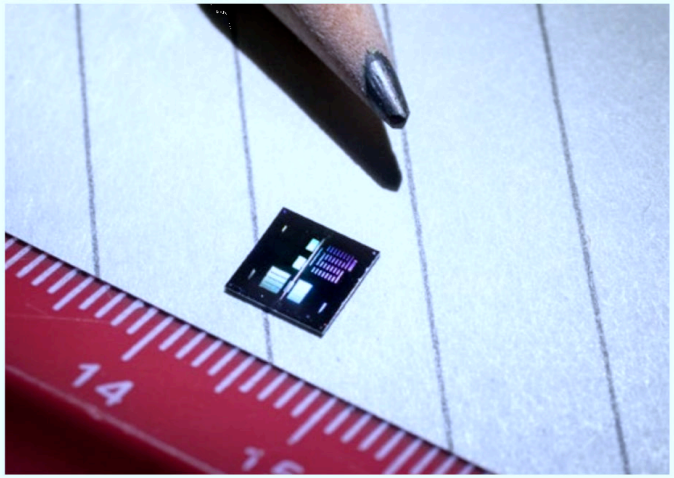
Another project uses Livermore's additive manufacturing capabilities to create a 3D resonator whose conical cavity may prolong quantum states. "Sources of energy loss in 3D resonators are different than in 2D resonators," explains Rosen. The team seeks to understand energy loss in resonator cavity areas of high current and high electric field. They are also investigating materials with high kinetic inductance, a property describing the energy stored in a superconductor's bound electrons. Experiments run on Livermore's test beds characterize electrical resistance along the cavity's surface.

The superconducting 3D resonator is made of a common alloy of titanium, aluminum, and vanadium known as Ti64, often used in additive manufacturing at Livermore. The cylindrical device measures 25 millimeters in diameter and is fabricated with selective laser melting because conventional machining cannot create the special cavity shape. Investigating and testing the Ti64 and other cavity systems augment Livermore's approach to quantum technologies. In 2018, physicist Gianpaolo Carosi led a workshop at the Laboratory's Livermore Valley Open Campus to review the latest in cavity research. Attendees hailed from other national laboratories, international organizations, and academic institutions. He says, "Better cavities mean better qubit control. We see much synergy in developing these systems for superconducting qubits and accelerator experiments."

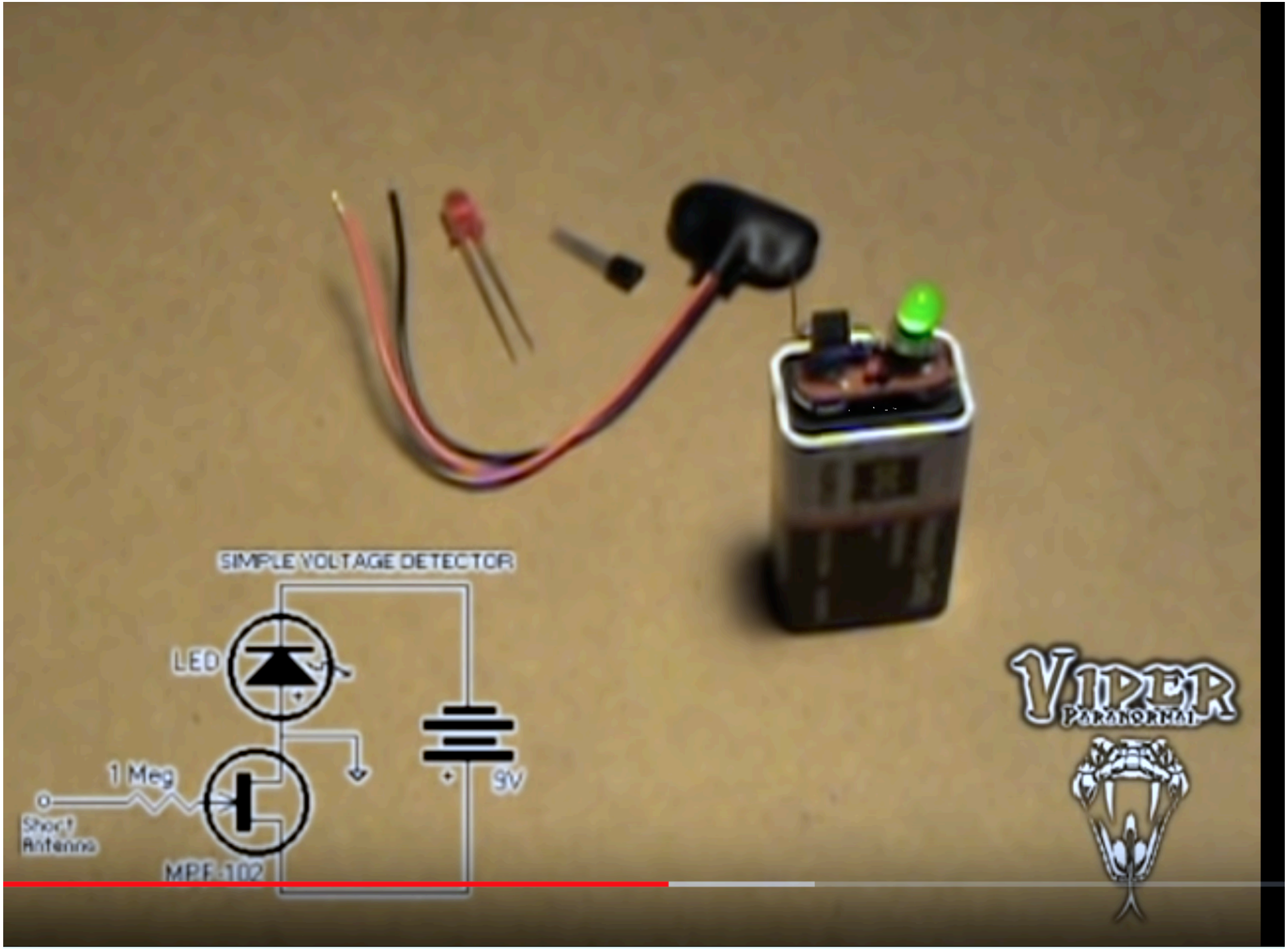
In addition, Laboratory researchers are collaborating with the University of California at Berkeley to explore other types of resonator materials, such as amorphous silicon. Rosen says, "Growing crystalline materials for 2D resonators is very difficult, so we are considering different



Livermore's innovative "quad core" QPU provides all-to-all connectivity among three qubits and four qudits. The design also improves resource efficiency with multipurpose ports that can be used for inputs or outputs.



Fabricated with the Laboratory's photolithography equipment, an aluminum quantum chip is ready for testing. This chip contains 5 resonator layouts, each up to 1 millimeter wide. (Photo by Randy Wong.)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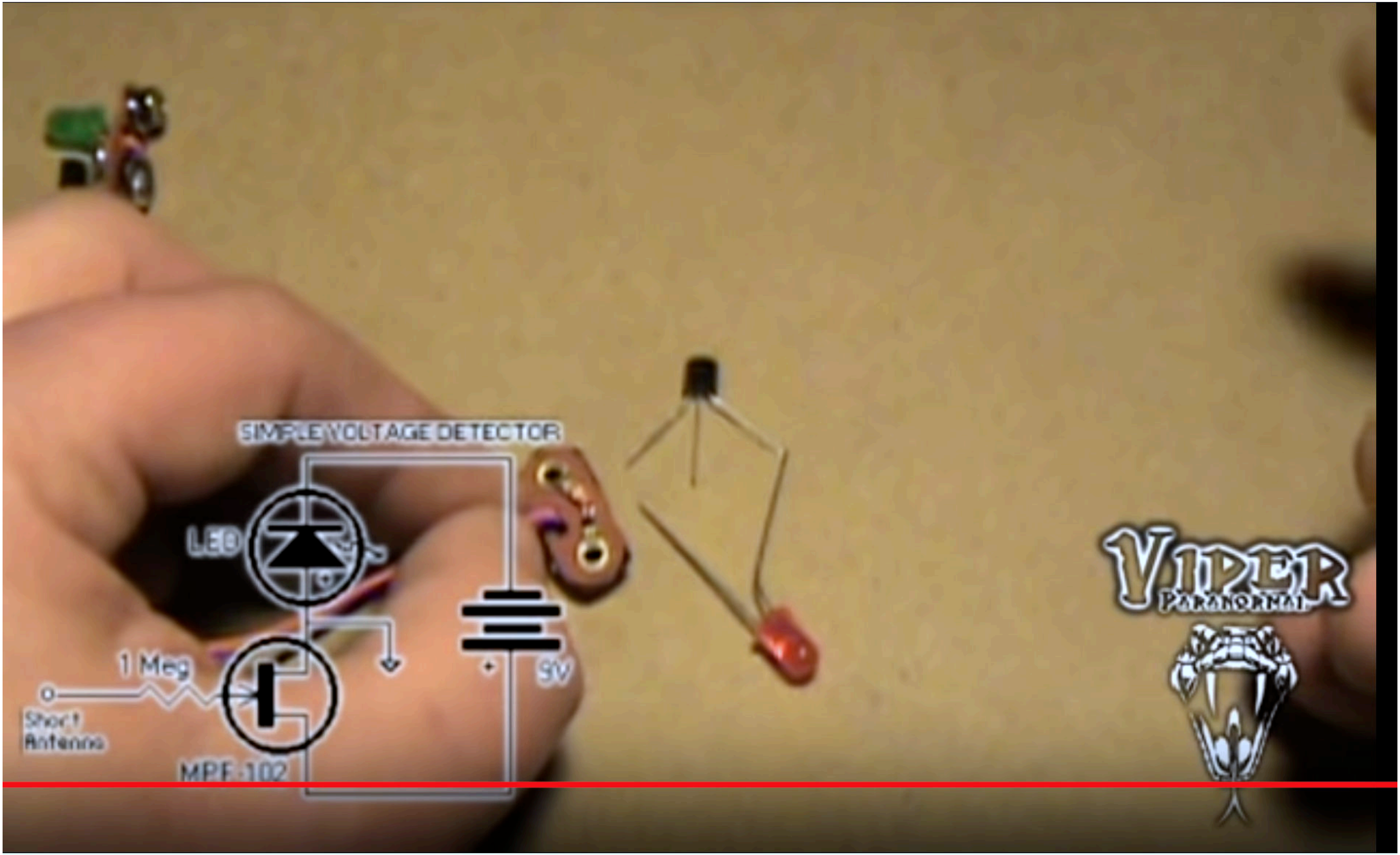
1 Meg
Short Antenna
MPF-102
9V
VIPER
PARANORMAL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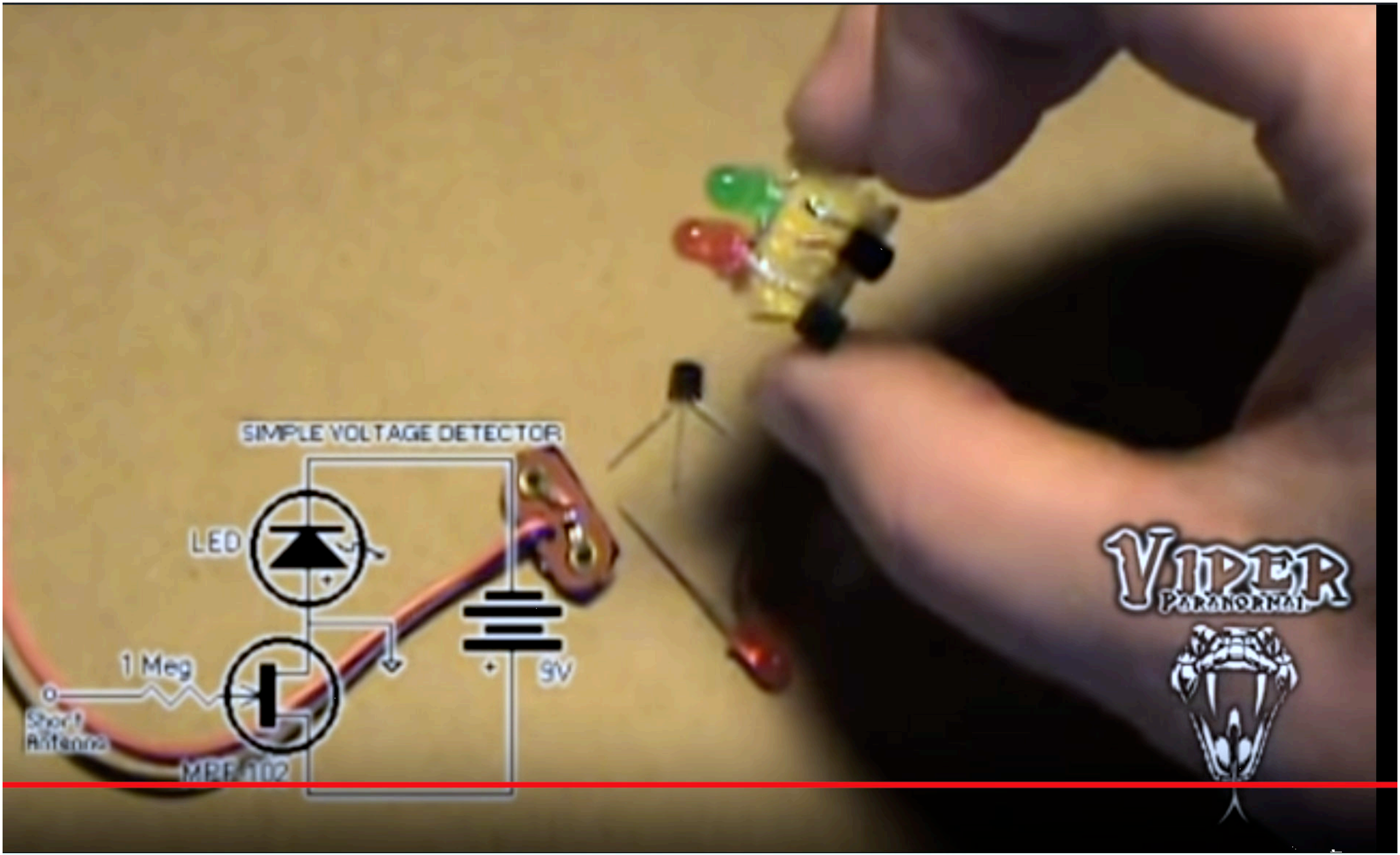
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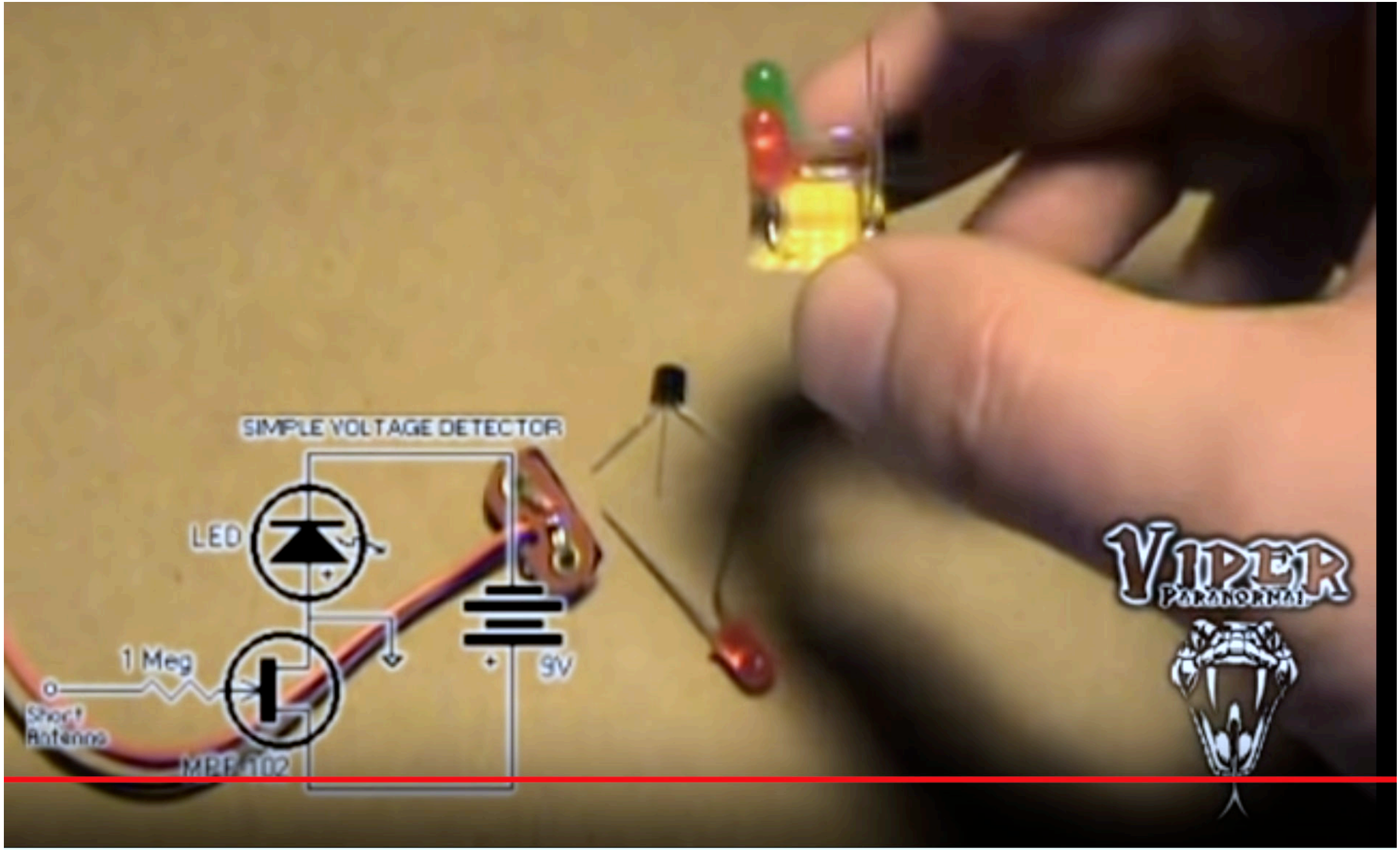
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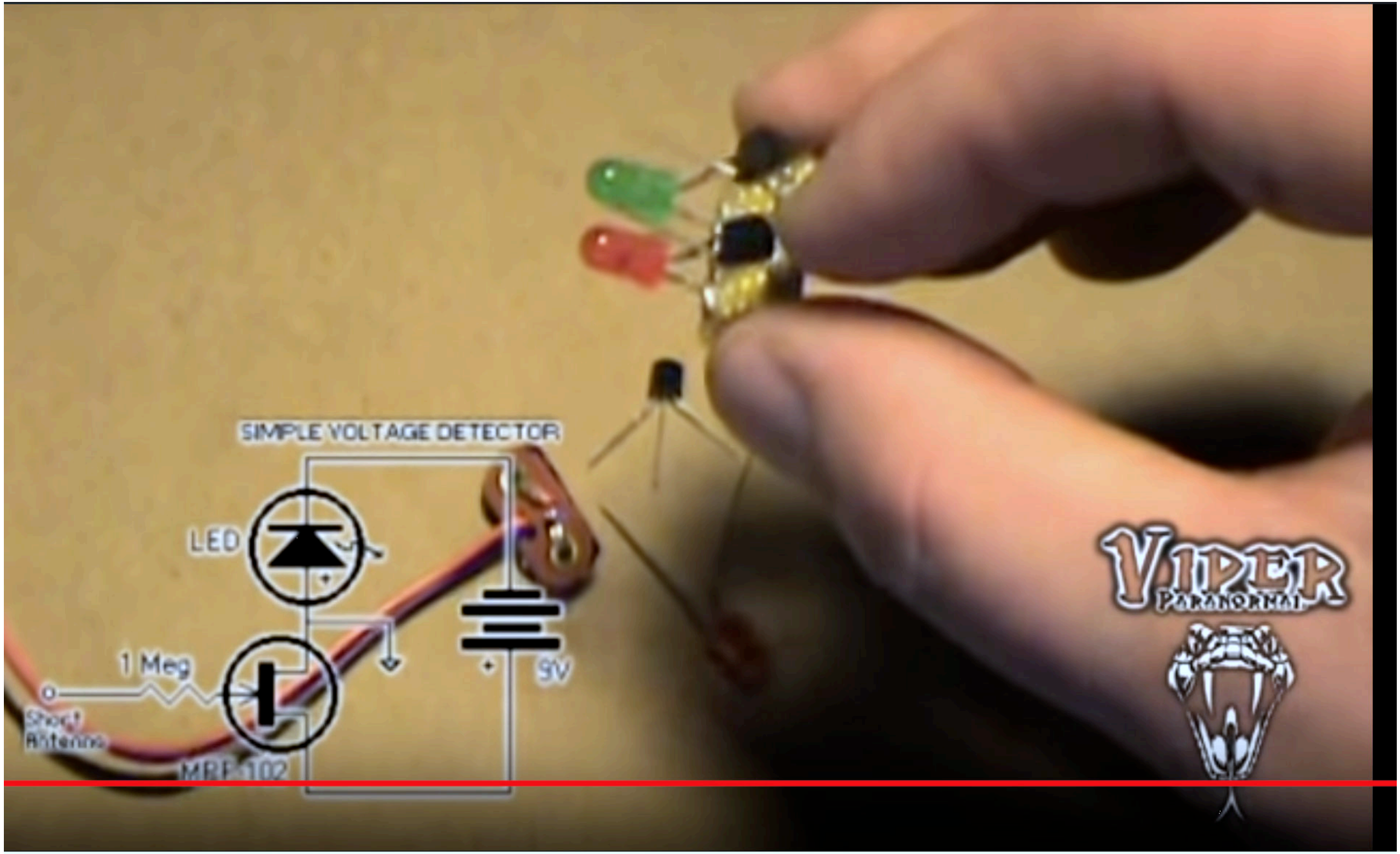
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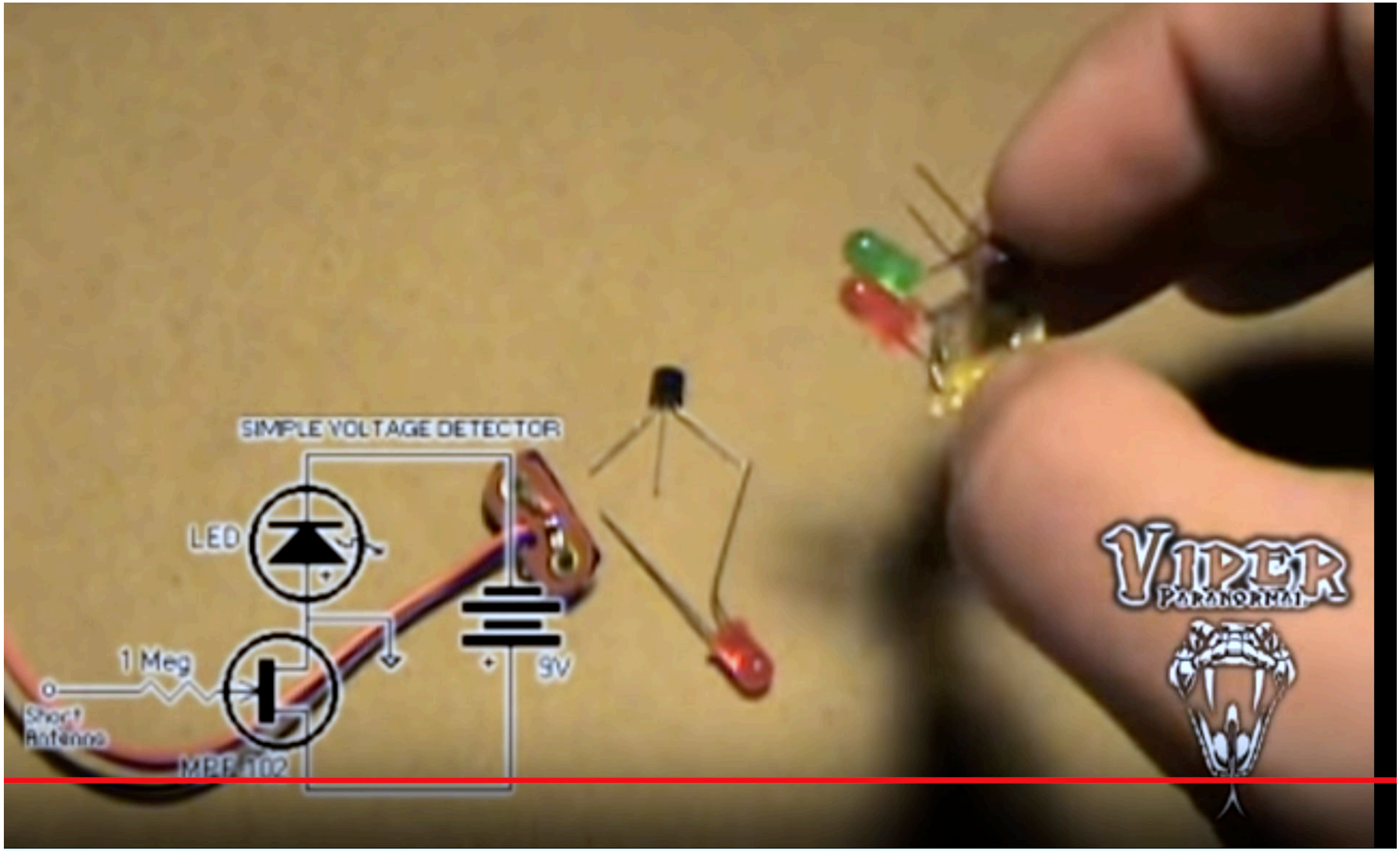
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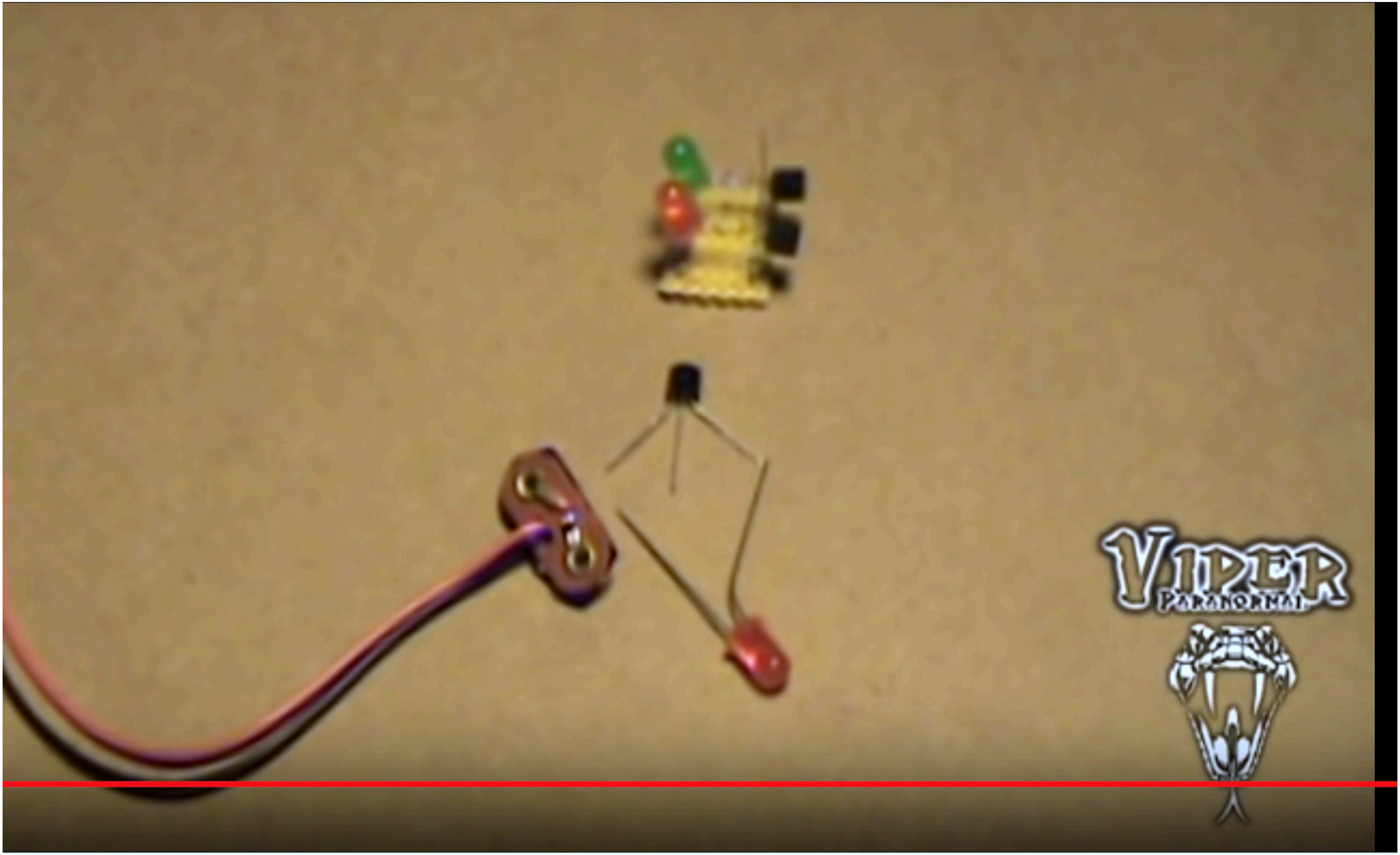
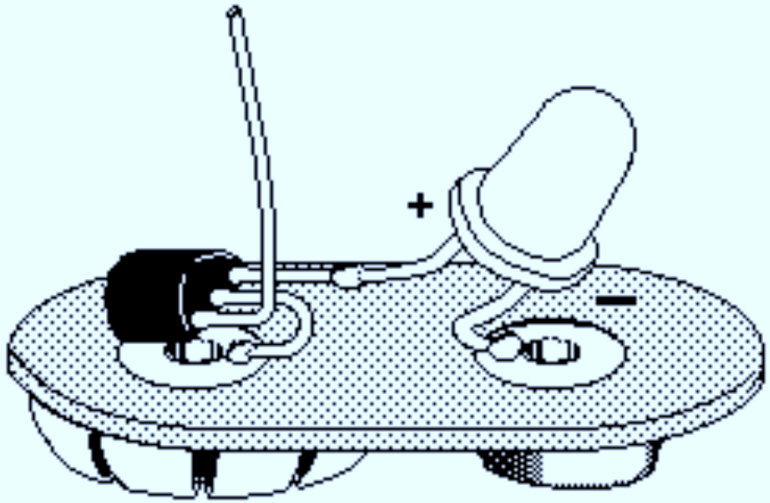

VIPER
PARANORMAL

PARTS LIST:

- 1 - Standard 9-volt battery
- 1 - MPF102 Field Effect Transistor (FET) Radio Shack #276-2062, or mail order
- 1 - any Red Light Emitting Diode (LED), eg Radio Shack #276-041
- MISC:
  - Battery connector (#270-325)
  - Alligator Clip Leads (#278-1156)
  - solder, if desired
  - 1-meg resistor (not required)
  - plastic, fur, foil, comb, tape dispenser, plastic cup



(Tiny version bult atop a 9v battery connector)

CONSTRUCTION HINTS

Warning: don't connect the battery until you are SURE you've hooked everything up exactly right. It's possible to burn out the FET or the LED if they are connected incorrectly. Don't let the transistor's wires bump together even briefly, or it will flash the LED and burn it out.

NOTE: Don't ever connect any LED directly to a 9-volt battery, it will burn out the LED. Without the transistor to limit the current, a bare LED needs a 1000-ohm resistor wired in series if connected to the 9-volt battery.

Warning: Avoid touching the Gate wire of the FET. Any small sparks jumping from your finger to the Gate wire can damage the transistor internally.

QUICK INSTRUCTIONS:

Use three clipleads. Bend the Gate wire of the FET upwards (see the small diagram above to see which lead is the Gate, or check the diagram on the cardboard of the Radio Shack FET.) The Gate acts as an antenna, so leave it unconnected. Use one cliplead to connect the middle transistor lead to the red positive lead for the 9V battery clip. Connect the remaining transistor lead to the positive lead of the LED (the longer LED lead is usually the positive one.) Connect the LED's remaining lead (the negative one) to the black negative lead for the 9V battery clip. Check all connections twice, then carefully connect the 9V battery to the battery clip. The LED should light up. If the LED remains dark, try lighting it up by waving an electrified plastic pen or ruler near the Gate wire (electrify the plastic by rubbing it on hair.)

The 1-meg resistor helps protect the FET from being harmed by any accidental sparks to its Gate lead. The circuit will work fine without this resistor. Just don't intentionally "zap" the Gate wire with an electrified object or finger.

To test the circuit, electrify a pen or a comb on your hair, then wave it close to the little "antenna" wire. The LED should go dark. When you remove the electrified pen or comb, the LED should light up again.

IF IT DOESN'T WORK, the humidity might be too high. Or, your LED might be wired backwards, or the transistor is connected wrong, or maybe your transistor is burned out. Make sure that the transistor is connected similar to the little drawing above. Also, if the polarity of the LED is reversed, the LED will not light up. Try changing the connections to your LED to reverse their order, then connect the battery and test the circuit again. If you suspect that humidity is very high, test this by rubbing a balloon or a plastic object upon your arm. If the balloon does not attract your arm hairs, humidity is too high.

1. SENSE E-FIELDS

Connect the circuit to its battery, and the LED will turn on. Comb your hair, then hold the comb near the Field Effect Transistor (FET) gate wire. The LED will go dark. This indicates that the comb has an excess of negative electric charge, and the FET responds to the electrostatic field surrounding the comb. It acts as a switch and turns off. Remove the comb and the LED brightens again. Wiggle the comb, and find at how great a distance the circuit still detects it. It's amazing how far an e-field extends around an electrified object. (But then, e-fields should extend to infinity, no?)

On a very low-humidity winter day the circuit will respond at a much greater distance. This happens because, when humidity is low, the combing of your hair then generates a much stronger separation of electric charge upon the comb's surface. Note that a metal comb will not work, since any separated electric charge immediately weakens by spreading to your hand and across your whole body. A plastic or hard rubber comb works well because rubber is an insulator and the imbalanced charges can't leak off the comb.

Try simply TOUCHING a plastic pen briefly to hair. The FET will detect even this tiny negative net-charge on the pen. The sensor will usually not indicate the equal positive that appears on your hair, since hair is made conductive by humidity, and the positive net-charge leaks to your head. The polarity of the surface electric charge on the comb or plastic pen is negative. The rule for this FET is, negative electric charge turns the switch (and the LED) off.

2. SENSE POSITIVE ELECTRI FICATION

This FET sensor is not an ideal educational device because it responds differently to positive than to negative. Create some positive net-charge by affixing a small tuft of hair or wool to the end of a plastic object (pen or ruler), then rub the hair upon another plastic object. (If we electrify some hair, we can avoid leakage losses by not touching it with fingers or other grounded object.) Bring the positively-electrified hair near the FET. Note that the LED becomes brighter, but when the hair is removed, the LED goes dark and stays that way. Bring the hair close by again, and the LED lights up again. Rules for this FET:

- negative objects turn the LED off, it lights again when removed.
- positive objects make the LED bright, then dark when removed.

Turn the LED back on by simultaneously touching fingers to the "Gate" wire and to some other part of the circuit. Or, touch a plastic pen to some hair, then wave it near the sensor, and the LED will light up. Remember this trick when doing other demonstrations. (Note: professional electrometers do not suffer from this "reset" effect, but professional electrometers cost several hundred dollars at the very least!)

The MPF-102 is an "N-channel" transistor, and is turned off when the movable negative electrons in the transistor body are pushed out of the silicon, changing it to an insulator. You can also buy "P-channel" transistors which work backwards: their silicon is full of movable positive charges called "holes," and they are turned off by a positive charge on the gate. Try buying a few 2N5460 transistors from the usual suppliers (Jameco , Mouser, Digikey)

3. ELECTRIC CHARGE IS CONSERVED

Mount a tuft of hair on a plastic rod, verify that it is completely discharged and does not affect the FET. Take a second plastic rod (or plastic pen!) and verify that it is also completely neutral. (Fondle the whole pen with slightly damp hands if not.) Now hold the plastic handle and touch the hair-tuft to the tip of the pen, separate them, then hold them up to the sensor one at a time. You'll discover that the end of the plastic pen is now negative and turns the LED momentarily off. The hair tuft is positive and turns the LED on, then off.

Contact between the hair and the plastic caused some assymetrical sharing of the equal positive and negative "electricity" within them. When they separated, some negative electric charges stayed with the plastic, leaving it with more negatives than positive (net negative charge.) At the same time, the hair was left with fewer negatives than positives, for a net positive charge. Atoms were torn apart, "ionized", and pairs of electrons and protons were yanked apart and separated to vast distances. Note: "static electricity" is not caused by friction, it is caused by contact between dissimilar materials, followed by separation. We could say that it's caused by "peeling".

4. PEELING CAUSES ELECTRI FICATION

The "peeling" effect can be demonstrated with a roll of plastic adhesive tape. Peel a few inches of tape off the roll and hold it near the circuit. The LED will show that the tape is strongly electrified. Now use the sensor to test the tape dispenser. You will discover that the roll of tape has an opposite polarity compared to the strip of tape. This illustrates that "static" electrification does not require friction, it only requires intimate large-area contact between dissimilar materials.

Matter is made of positive and negative electric charge, and the peeling of tape can separate the electric charges that were already there in the matter. Because the plastic backing of the tape is a different material than the adhesive, when they touch together there is assymetric bonding and electron-sharing. This leads to separation of opposite charge when we peel tape from its roll. Also, try taking two strips of tape, stick them back to front (fold little tabs so you can separate them again,) pat them down with moist hands to discharge them, then peel them apart. Hold each near the sensor. One strip indicates strongly positive, the other is equally negative. The strips will attract each other. Try other demonstrations from Sticky Electrostatics, using the Charge Detector to show polarity of various parts of the tape.

[NOTE: people have found that "Scotch" brand tape doesn't work as well for the above activity. It contains some chemicals that prevent electrification. Use some other, inexpensive brand of tape instead.]

6. CHANGE THE SENSITIVITY

The circuit amplifies tiny voltages, and we can change it's "gain." Obtain a small capacitor with a value below 100 picofarads. Any value will do. Connect it between the FET's gate lead and one other FET lead (doesn't matter which one.) This greatly reduces the sensitivity of the device. In situations where the sensor is TOO sensitive, this can make a big difference. Capacitors larger than 100pF can be used, but they REALLY wipe out the sensitivity. The large the value, the smaller the sensitivity. The capacitor does this because it forms part of a circuit called a "Capacitive voltage divider," a sort of loudness control for invisible voltage fields.

Next, make the circuit MORE sensitive. Obtain an alligator clip-lead, and connect it to the Gate lead of the FET. Let it hang loose without touching anything. You'll find that this has vastly increased the sensitivity of your FET circuit. It does this by increasing the capacitance between the FET gate and the source of the voltage signal. On a dry day it will respond to hair-combing from 20ft away. If an oldschool crt-style TV screen is available, the sensor will act weird (especially when people walk between the screen and the sensor.) The clip lead acts as an extra antenna, and the longer it is, the more sensitive the FET circuit becomes.

7. FIELD DISTORTIONS

Electrify a plastic object, place it on an insulating support, place the FET sensor near it, then make sure the LED is turned on. If you now wave your hand near the object or the sensor, the LED will respond. Your hand causes the e-field around the object to distort and change. Even though your hand is not electrified, the FET responds. You've created a sort of "DC Radar" system which sends out a signal and then responds when nearby objects "reflect" the signal. Some types of industrial sensors ("proximity" or "capacitive" sensors) use this effect. Some burglar alarms do as well.

8. VANDEGRAAFF SENSING

See at what distance your FET electrometer can sense the e-field from an operating tabletop VandeGraaff electrostatic generator. Suddenly discharge the generator by using a grounded sphere electrode, and watch the distant FET respond. You are actually sending out radio waves with nearly zero frequency when you do this. The FET does not actually respond instantly, there is a speed-of-light delay (about one nanosecond per foot of distance.) It takes a short while for the wave of vanishing e-field to reach the sensor. Radio waves are simply propagating changes in electric fields, so your VDG machine and FET sensor constitute a simple radio transmitter and receiver.

9. HOMEMADE CAPACITORS

10. DIPOLE ANTENNA

After you use this FET device for awhile, you'll get the idea that it has just a single antenna terminal. However, like all voltmeters, it actually has two. The rest of the circuit acts as the other terminal. To demonstrate this, build a miniature version of the detector circuit onto the top of a 9V battery. If you hold the battery as usual, the Gate does act as the antenna, and negative objects make the LED go dark. Now carefully grasp the Gate wire between fingers and lift the whole device into the air. Avoid touching the battery. If you now hold a negatively electrified object near the battery, the LED will get brighter instead of dimmer. Polarity of operation has been reversed. If you lay the whole unit down upon an insulating surface and approach it with electrified objects, you'll find that the FET gate wire responds with one polarity, while the battery and the rest of the circuit responds with the other. Try connecting the gate wire to earth ground, then suspend the rest of circuit with an insulating handle. If you hold up objects having various polarities, you'll find that polarity of operation is opposite that of the gate wire.

11. 'SCUSE ME, WHILE I SENSE THE SKY

All over the earth, thunderstorms are transporting negative electric charge downwards and positive charge upwards. As a result, the earth is electrified negatively everywhere, while the sky is positive. (Actually, it's the conductive ionosphere which is positive.) The FET sensor can detect this. Take it outdoors, away from trees or buildings. Hold it high in the air, then lower it to the ground while watching the LED. (Maybe get a tall adult to do this.) The LED will get darker when the device is lowered, and get brighter when it is raised up. The earth is negative! Maybe hang a cliplead antenna on the sensor wire to improve sensitivity. (This polarity reverses when there is a thunderstorm directly overhead, but I wouldn't suggest standing out in the open when there is a chance that lightning may strike!)

12. BATTERY VOLTAGE (DANGER!)

WARNING! DANGEROUS VOLTAGE INVOLVED
This one is for science teachers and advanced experimenters only. Voltages above 60V are a shock hazard! If you do not know how to safely work with dangerous high voltage, then don't perform this experiment.
WARNING! DANGEROUS VOLTAGE INVOLVED

Get ten 9V batteries. (Old batteries are fine, as long as they still put out 8V or more.) Form them into a chain like so: place five batteries side by side on the table, so the connectors all are aligned the same way. Then link them together by plugging the other five batteries upside down into the first batteries. This creates a connected block of batteries. It's a ninety-volt battery. Now wave the antenna of the FET circuit around this battery chain. DON'T LET THE ANTENNA TOUCH ANY OF THE BATTERIES OR THEIR CONNECTORS! You'll find that the negative end of the battery chain will make the LED go dark.

See what's happening? Batteries can create "static electricity" effects. But it only happens at high voltage. The voltage of a single 9V battery does not affect the FET sensor, because the e-field of a 9V battery is a bit too weak. But a 90V battery creates an e-field ten times stronger!

WHERE IT CAME FROM

The circuit is an electronic version of an Electroscope. Electroscopes are simple science instruments for measuring high voltage. Electroscopes have been in use for hundreds of years.

This FET charge-detector circuit is based on a much earlier circuit called "electronic electrometer" made with a vacuum tube. As a kid I found the schematic in an old paperback book on ham radio projects from Pop. Electronics magazine. It used a 6J7 tube and an NE2 bulb and 100K resistor connected to the plate terminal. I blew away my allowance for weeks to buy that tube (plus a 6.3V transformer, plus a fancy bakelite box.) It used 120VAC line voltage connected to the cathode and the LED (the tube then acts as a rectifier.) The 6J7 tube has a terminal on the top which connects to the tube's Grid terminal (a "grid cap," rather than the more usual plate cap.) My 'antenna' came from a coffee can run through the can-opener, plus the plastic can lid to protect the sharp metal edge. When a negatively electrified plastic pen was waved near the grid, the glowing NE2 would turn off. On winter days the sensitivity was quite amazing.

Other modern devices also respond to nearby electrified objects. When FETs first were sold, I bought one and used an ohm meter to measure across source/drain. Sure enough, when an electrified object was waved near the unconnected grid wire, the ohmmeter reading went crazy. Also, if you have an FET-type opamp chip (TL072, etc.), and you leave the input floating, or if you have CMOS logic chips with the inputs floating, they will sometimes act crazy when you wave your hand around them. Unless the humidity is very high, your body usually has enough DC charge to turn them on or off.

I tested several common FETs to find a sensitive one, and discovered that MPF102 was much more sensitive than the original vacuum tube I had as a kid. With a couple feet of gate terminal wire, I could turn it on and off by waving an electrified plastic comb back and forth from over ten feet away. (With longer antennas it started picking up 60Hz hum, and was overloaded.) Later at the Museum of Science in Boston I designed an exhibit, an array of many hundreds of these things, each with a small steel screw as the antenna. See "Aura Tester". Also see a bit more about the circuit.

HOW IT WORKS

HOW IT WORKS

A complete description of this device requires delving into the physics of solid state electronics. Instead, here is a quick description based on the fluid analogy for electric charge.

Metals act as conductors NOT because charge can pass through them. Instead, they are conductors because *they contain charge which can move.* Think of a metal wire as being like a hose that's aways full of water. And remember, vacuum is an insulator, even though it presents no barrier to charges. But vacuum contains no charges which can move.

The "sea of charge" in a metal is not very compressible. To squeeze (or remove) even a tiny bit of it would take a huge amount of energy. In metals, the "electricity fluid" is dense like water, since each atom contributes one electron to an "electron sea." The number of atoms is enormous, so the amount of mobile charge is enormous too. Inside metals, , atoms' outermost electrons don't stick to single atoms but instead orbit all throughout the material. (So, a metal object is like a tank of "fluid electricity," and a metal wire is like a full pipe.) If we could remove all the movable electrons from a metal, that metal would become an insulator. Unfortunately, removal of electrons from even the thinnest metal wire requires gazillions of Newtons of electrostatic force, and develops gazillions of volts of potential difference. ("Gazillions" means some huge number with waaaay too many zeros!). Metals are highly conductive, and we can't easily change that.

This is where silicon comes in. While a metal's electron-stuff acts like a dense fluid, in silicon the mobile charges act like a sparse and compressible gas. In silicon, only very few atoms contribute a mobile electron to the "charge sea." In fact, the silicon doesn't really contribute electrons at all, and ultra-pure silicon is an insulator. Instead, only the tiny bits of impurity atoms in the silicon will contribute movable electrons. If we only put a tiny, tiny fraction of a percent of impurities into the silicon mix, then the resulting material's movable electron-stuff becomes much more compressible than the "electron sea" within a metal. It acts almost like a gas, not an incompressible fluid. This reduces the required voltage and force (by a gazillion times!) reducing the force that's needed to push the movable charges out of the silicon. The electron-sea of a metal is not very compressible. The electron-gas within silicon is very compressible.

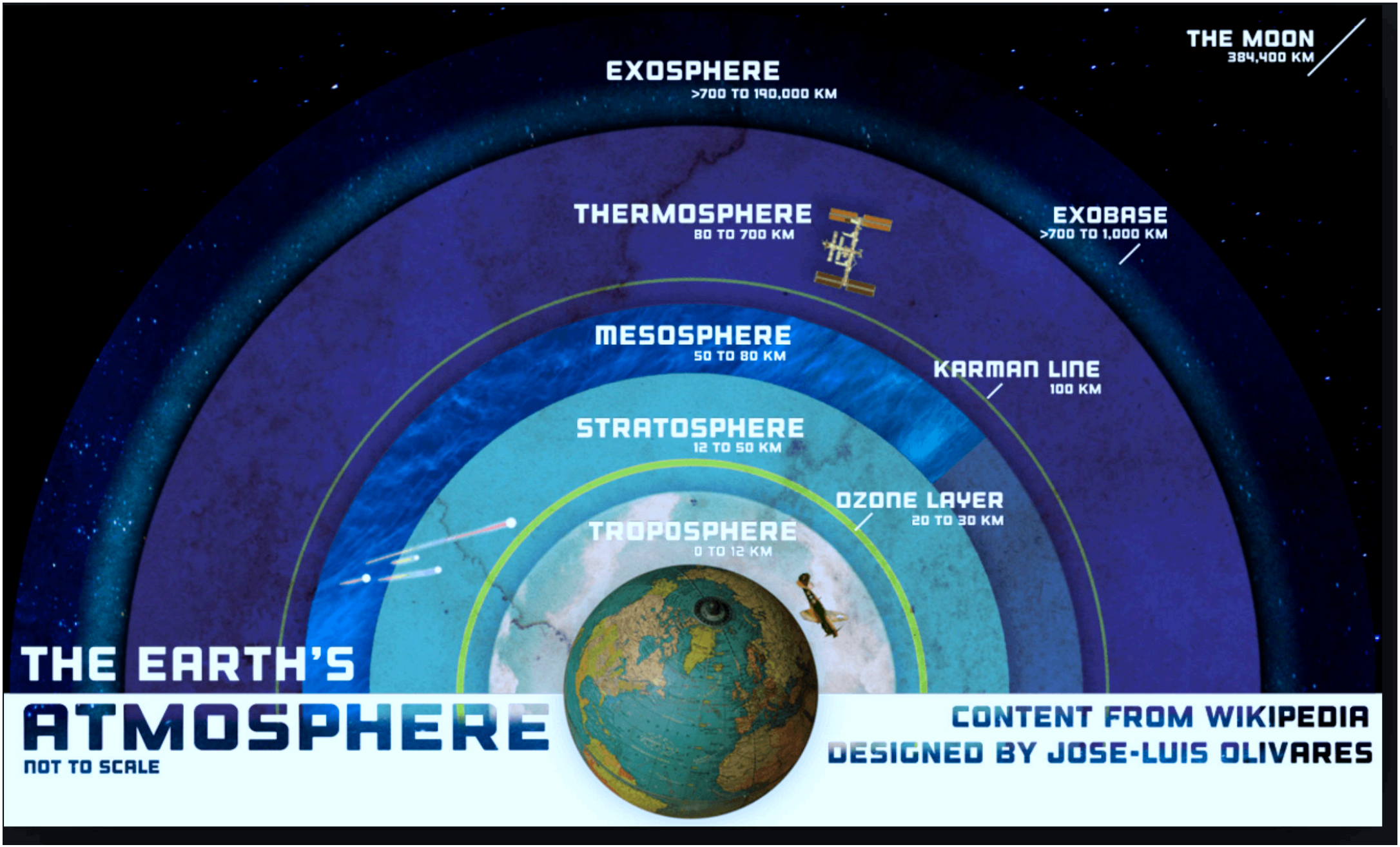
So what? Well, if we can push the "electron sea" out of a conductor, we can change it into an insulator. It would be like pinching a hose shut, so no liquid could flow. I would be like turning off a switch, but almost no work is required to do this. Just apply an electrical "push" in the form of electrostatic repulsion, then the silicon becomes insulating, so large currents can be switched on and off.

The Field Effect Transistor is basically a tiny wafer of silicon with its edges connected to the "Source" and "Drain" wires, and the "Gate" lead connected to a metal plate layed upon the surface of the silicon wafer. When the gate lead is electrified negative, it repels the electron-gas out of the silicon and converts it into an insulator. The silicon wafer acts like an electric switch that is turned off by pure voltage. If we picture the silicon as being like a rubber hose full of water, then the gate applies a sideways force which pinches the hose closed. Placing a negative net-charge on the gate wire causes the "switch" to turn off and the LED to go dark. Merely holding a negatively electrified object near the Gate lead will apply a force to the electrons in that little Gate wire, which pushes them into the metal plate, which repels away the electrons in the silicon, which pinches closed the conductive path.

Interesting part: it really takes no energy to turn off the FET. It does take electrostatic force, but force is not energy! And so, even a very distant object with a feeble net-charge can affect the FET and control the much larger energy being directed to the LED.

The FET is not really turned off by negative net-charge. That is an overly simplified description. It is really turned off by a DIFFERENCE in the net-charge between the silicon and of the metal plate. You can either electrify the metal plate negatively, or electrify the silicon positively (which also electrifies the battery, LED, and circuit wires.) Both will turn the FET off by pushing (or pulling) the electrons out of the silicon. Think of the rubber hose again: either you can squeeze it shut with fingers, or you can lower the pressure of the whole water circuit, and the hose will be collapsed by "suction" (by air pressure, actually.)

What are FET transistors good for? Well, most modern computers are constructed almost entirely from FETs. The megabytes of memory are formed from little grids of millions of microscopic FETs, each with a net-charge stored on its gate lead signifying a zero or a one. The processor chips are built of logic switches with Gate voltage as their input, and on/off switching as their output. Other things: super-FETs can be built which actually contain many thousands of small FET transistors all hooked in parallel. These VFETs or HEXFETS are often used as the main transistors of large audio amplifiers. A tiny vibrating voltage on their gate lead can route many amperes of charge-flow at sound-frequency, through the loudspeakers, and a handful of FET wafers the size of your fingernail control the audio power for a whole rock concert.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KARMAN LINE
100 KM
STRATOSPHERE
12 TO 50 KM
OZONE LAYER
20 TO 30 KM
TROPOSPHERE
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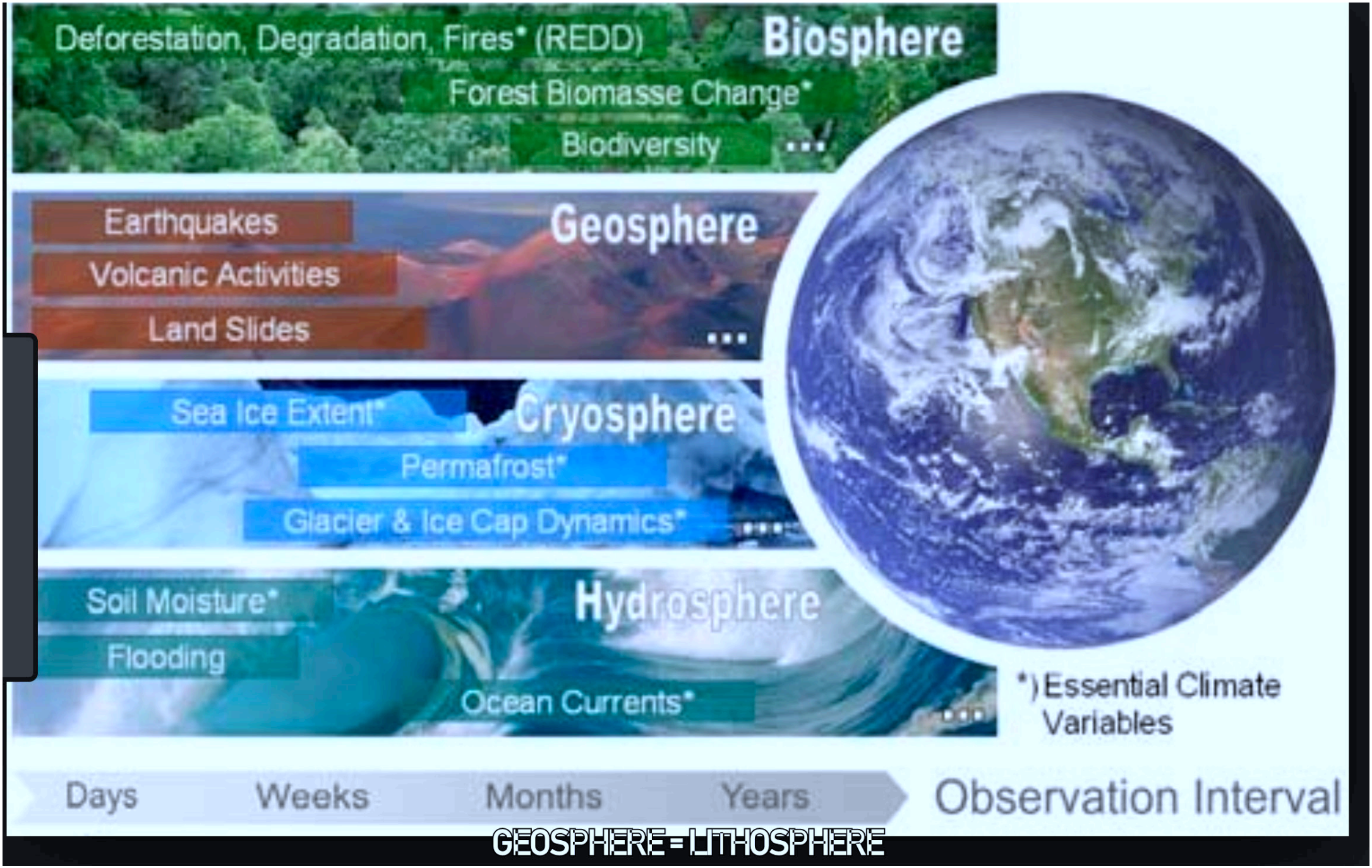
Deforestation, Degradation, Fires* (REDD)
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Earthquakes
Geosphere
Volcanic Activities
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Permafrost*
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*) Essential Climate Variables
Days
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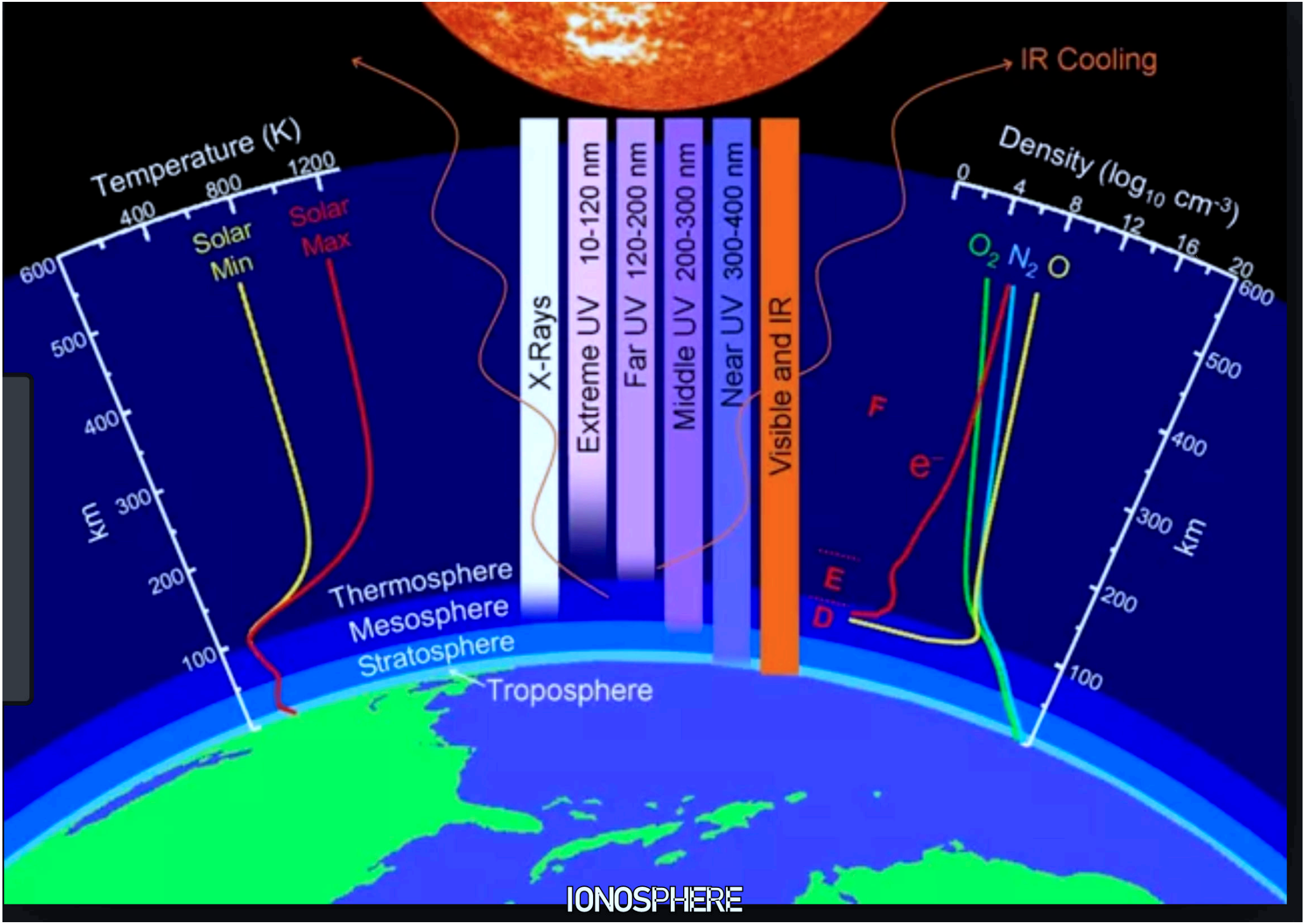
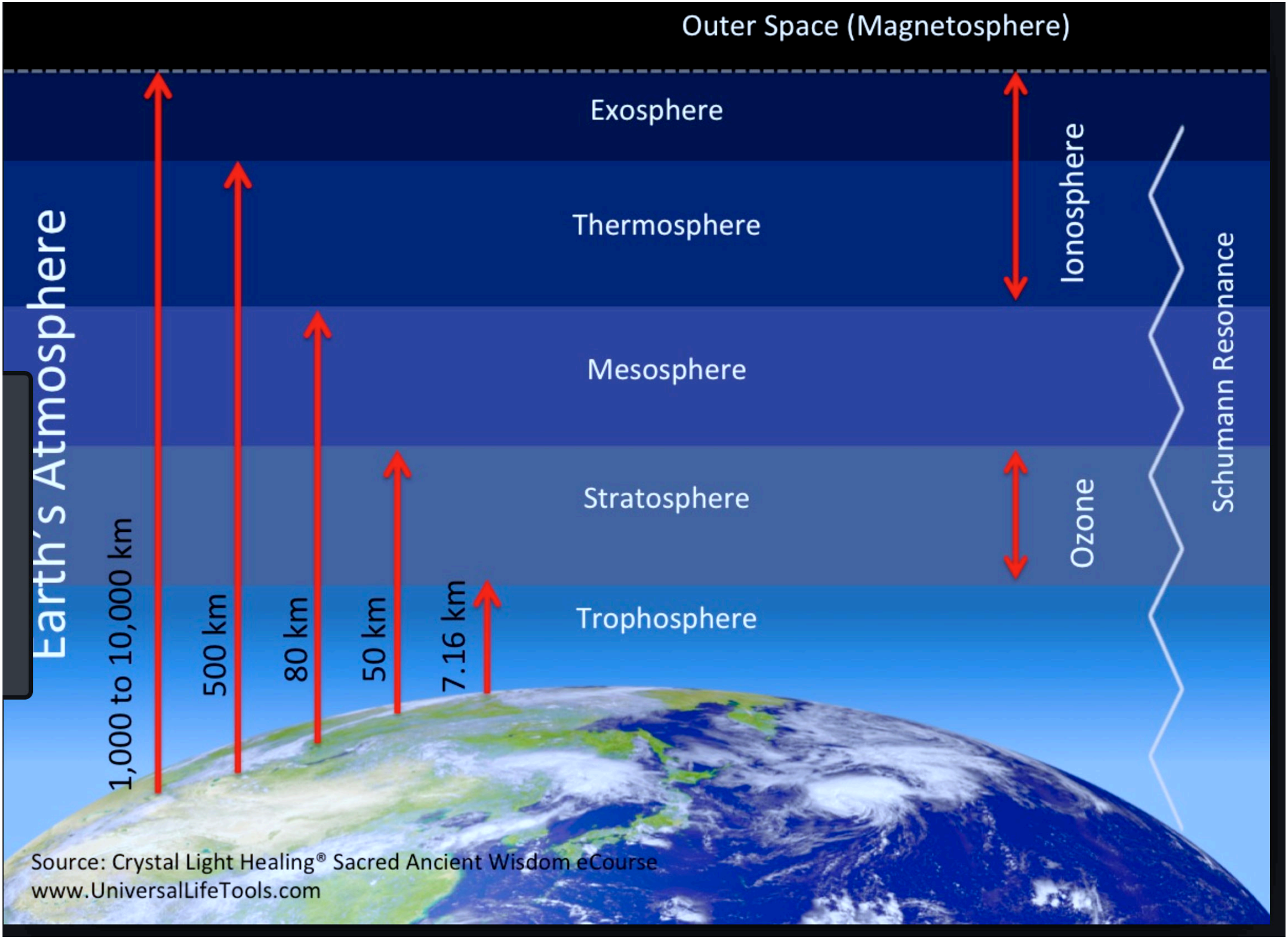
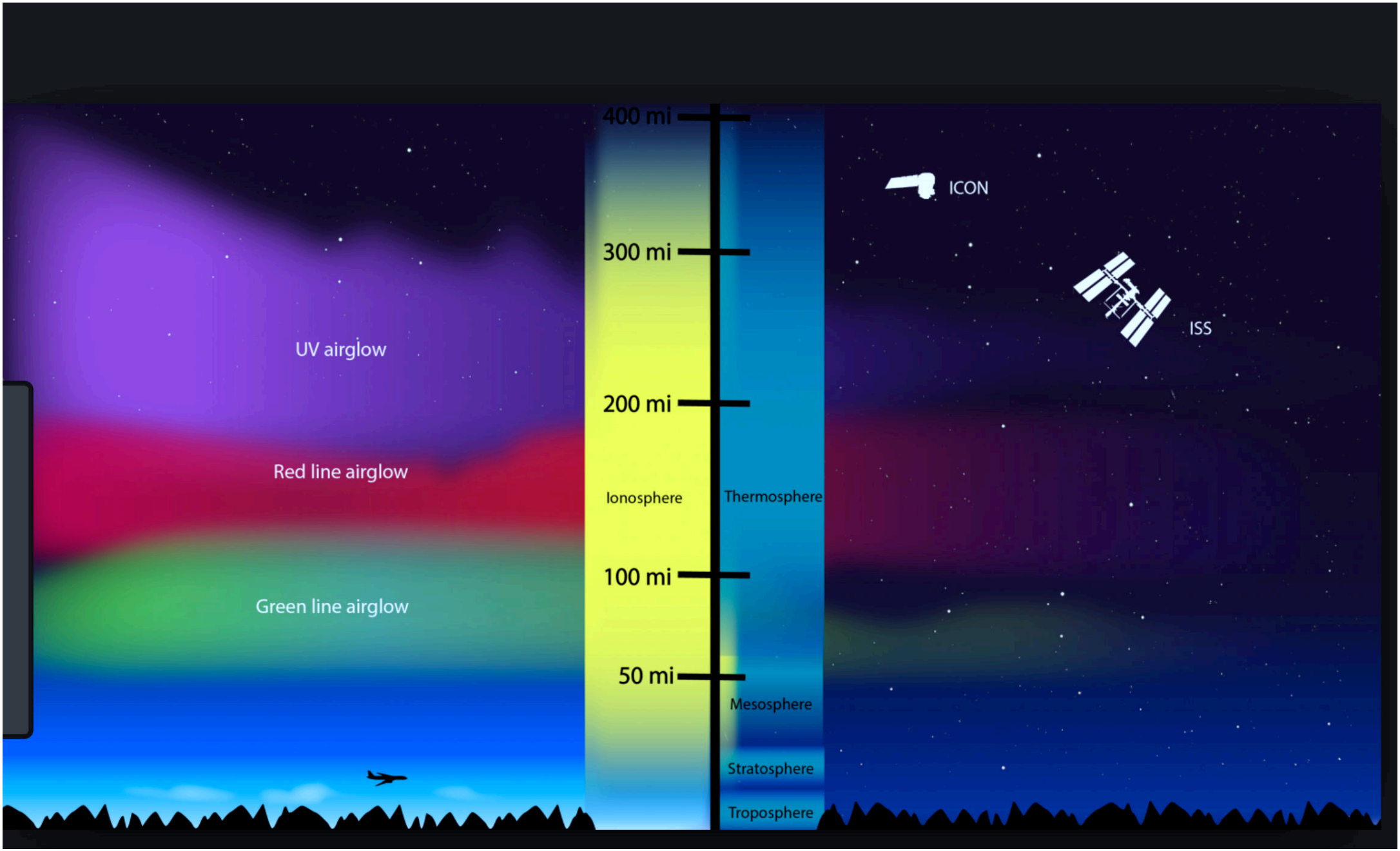
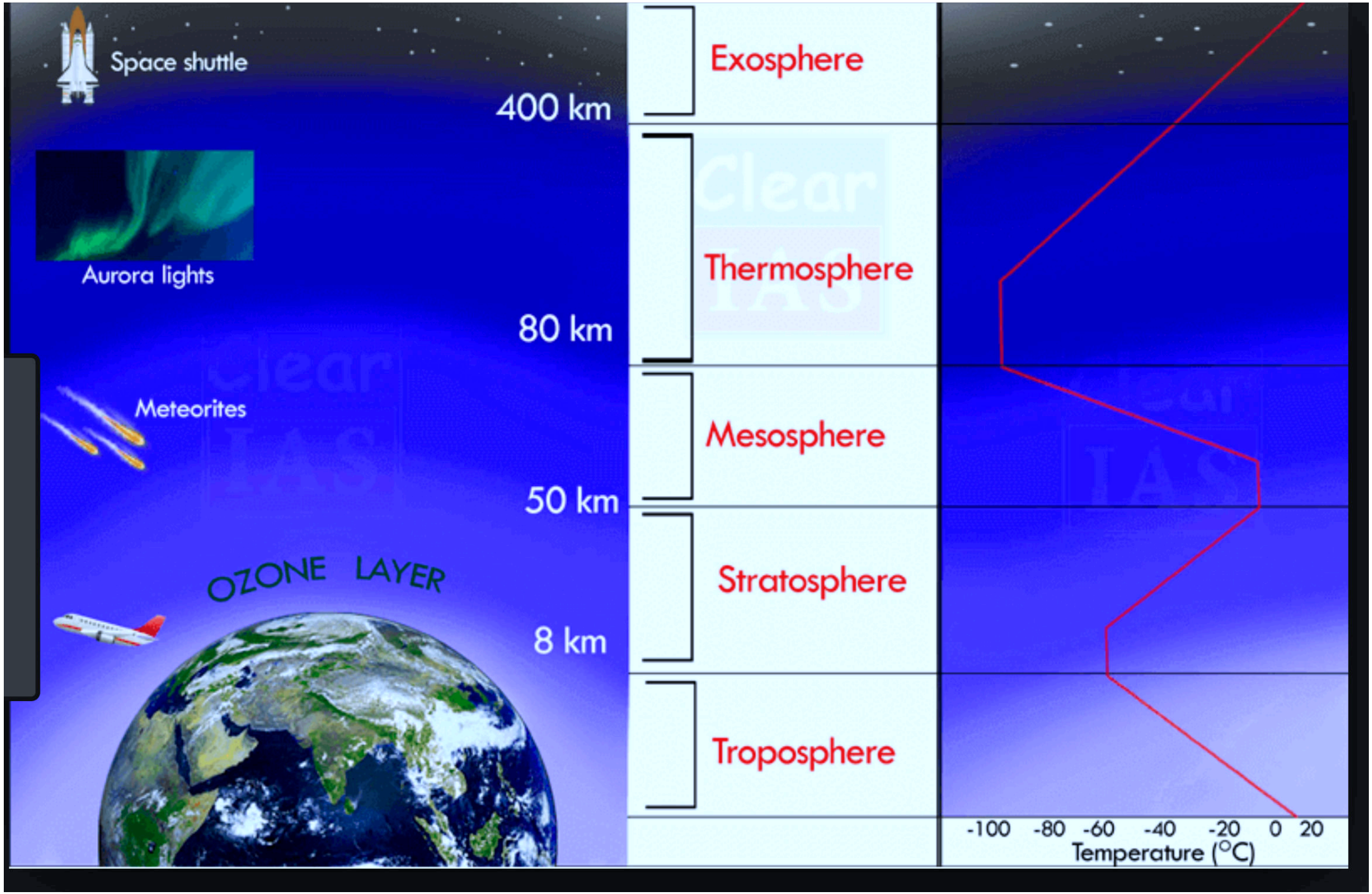
Observation Interval
GEOSPHERE = LITHOSPHERE

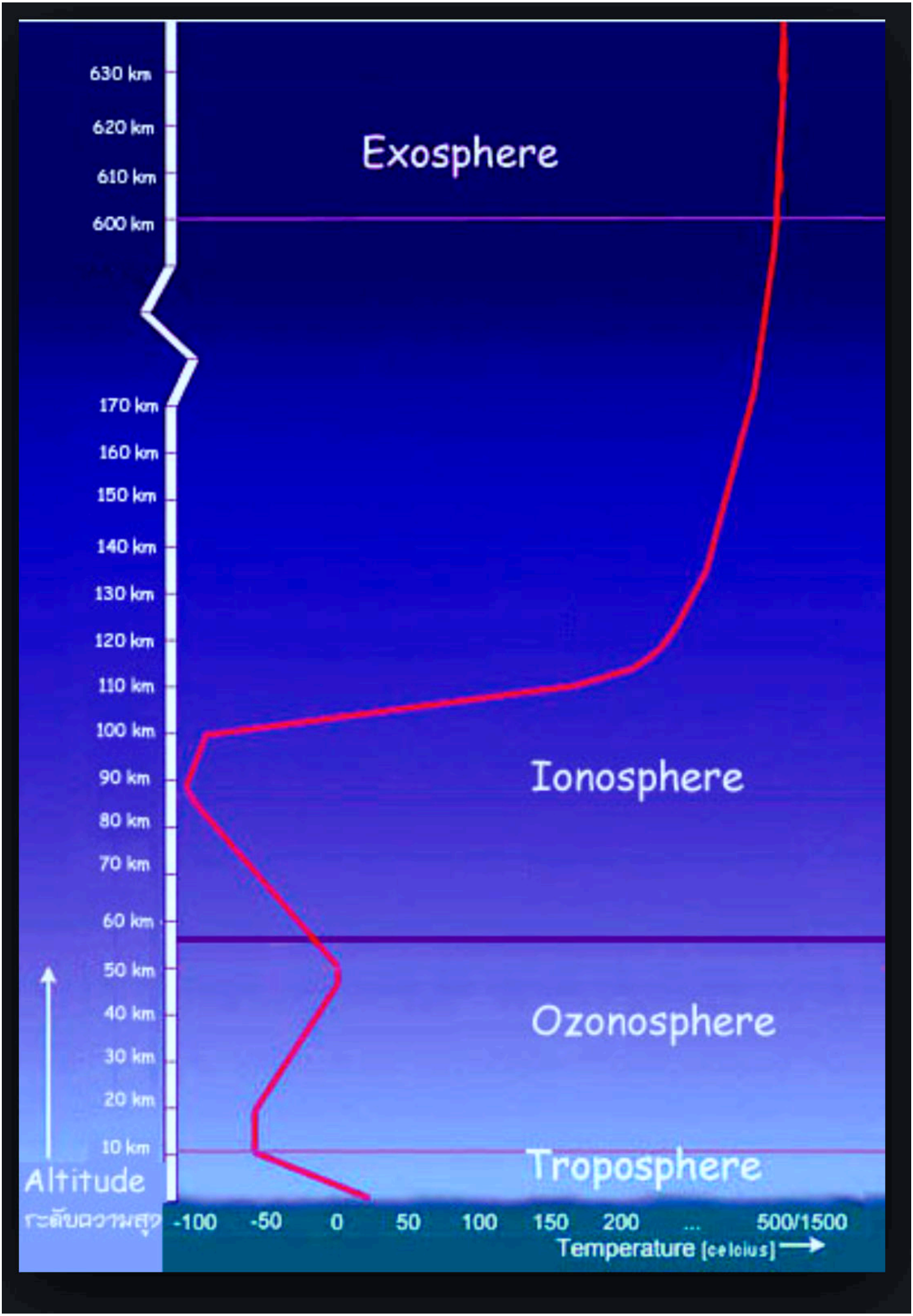

IR Cooling
Temperature (K)
400
800
1200
Solar Min
Solar Max
600
500
400
300
200
100
km
X-Rays
Extreme UV 10-120 nm
Far UV 120-200 nm
Middle UV 200-300 nm
Near UV 300-400 nm
Visible and IR
Thermosphere
Mesosphere
Stratosphere
Troposphere
F
e⁻
E
D
Density (log10 cm-3)
0
4
8
12
16
20
O2 N2 O
600
500
400
300
200
100
km
IONOSPHERE


Outer Space (Magnetosphere)
Exosphere
Thermosphere
Mesosphere
Stratosphere
Trophosphere
Earth's Atmosphere
1,000 to 10,000 km
500 km
80 km
50 km
7.16 km
Ionosphere
Ozone
Schumann Resonance
Source: Crystal Light Healing® Sacred Ancient Wisdom eCourse
www.UniversalLifeTools.com

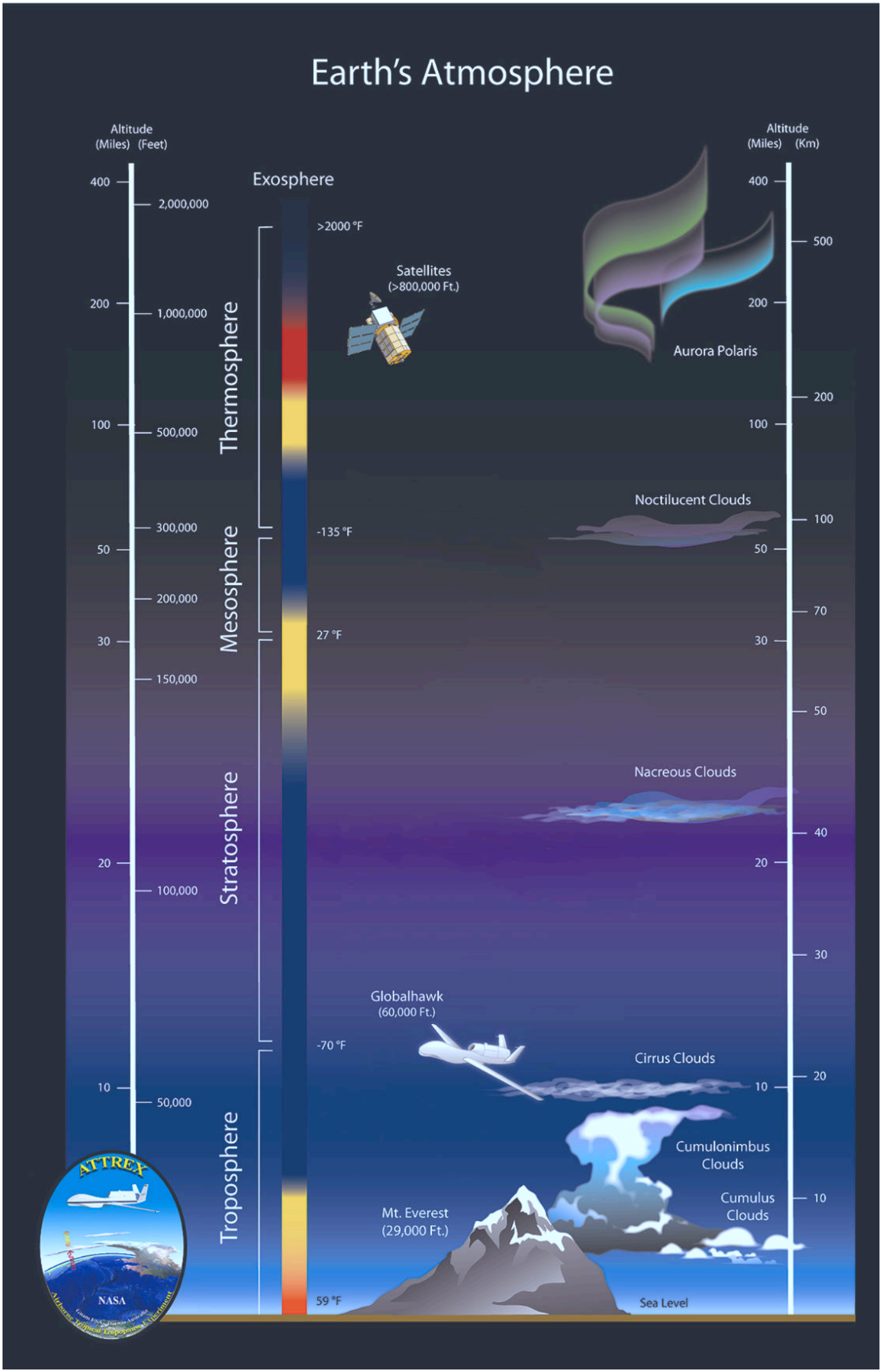
LITHOSPHERE
BIOSPHERE
ATMOSPHERE
HYDROSPHERE
CRYOSPHERE

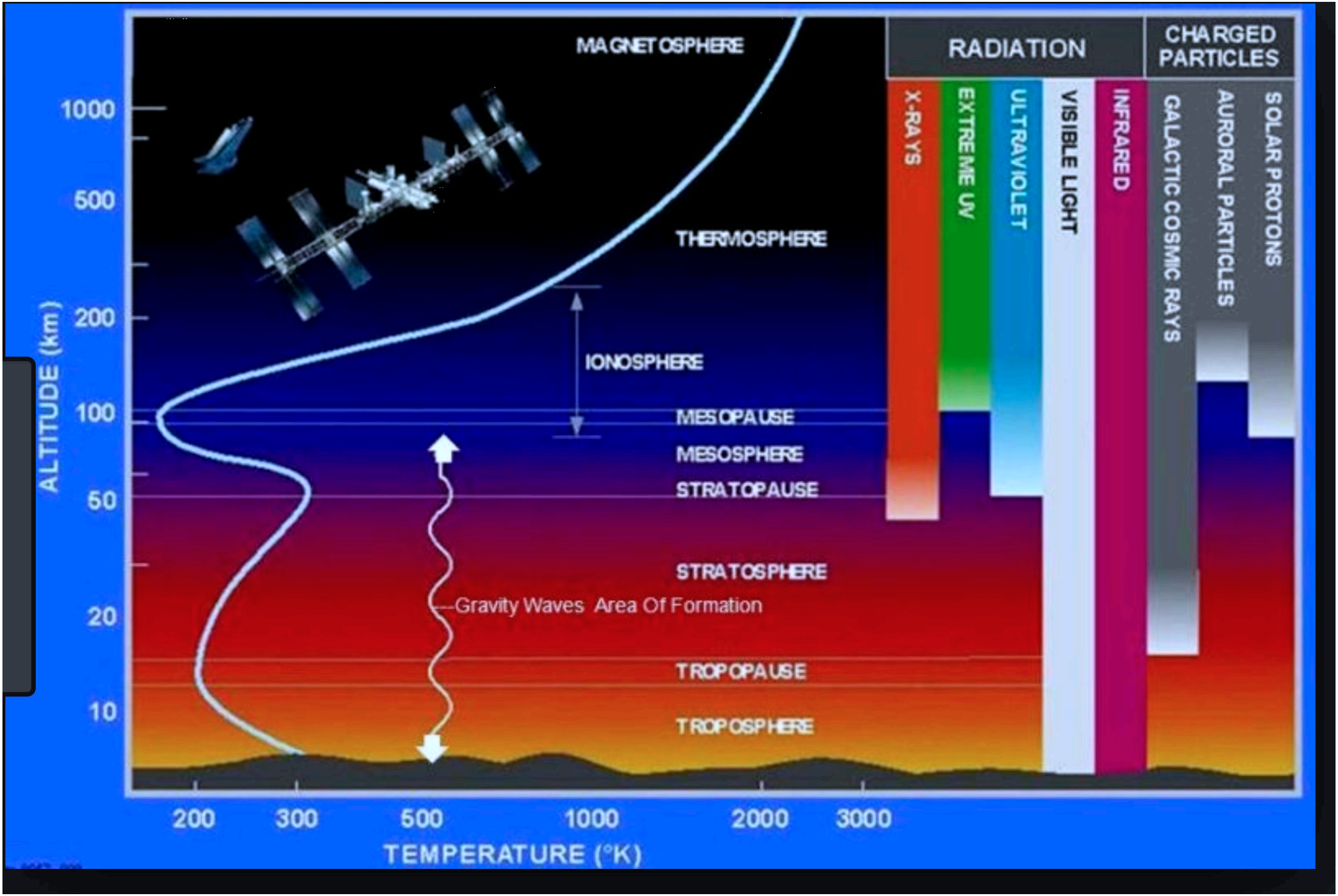

400 mi
300 mi
200 mi
100 mi
50 mi
UV airglow
Red line airglow
Green line airglow
Ionosphere
Thermosphere
Mesosphere
Stratosphere
Troposphere
ICON
ISS

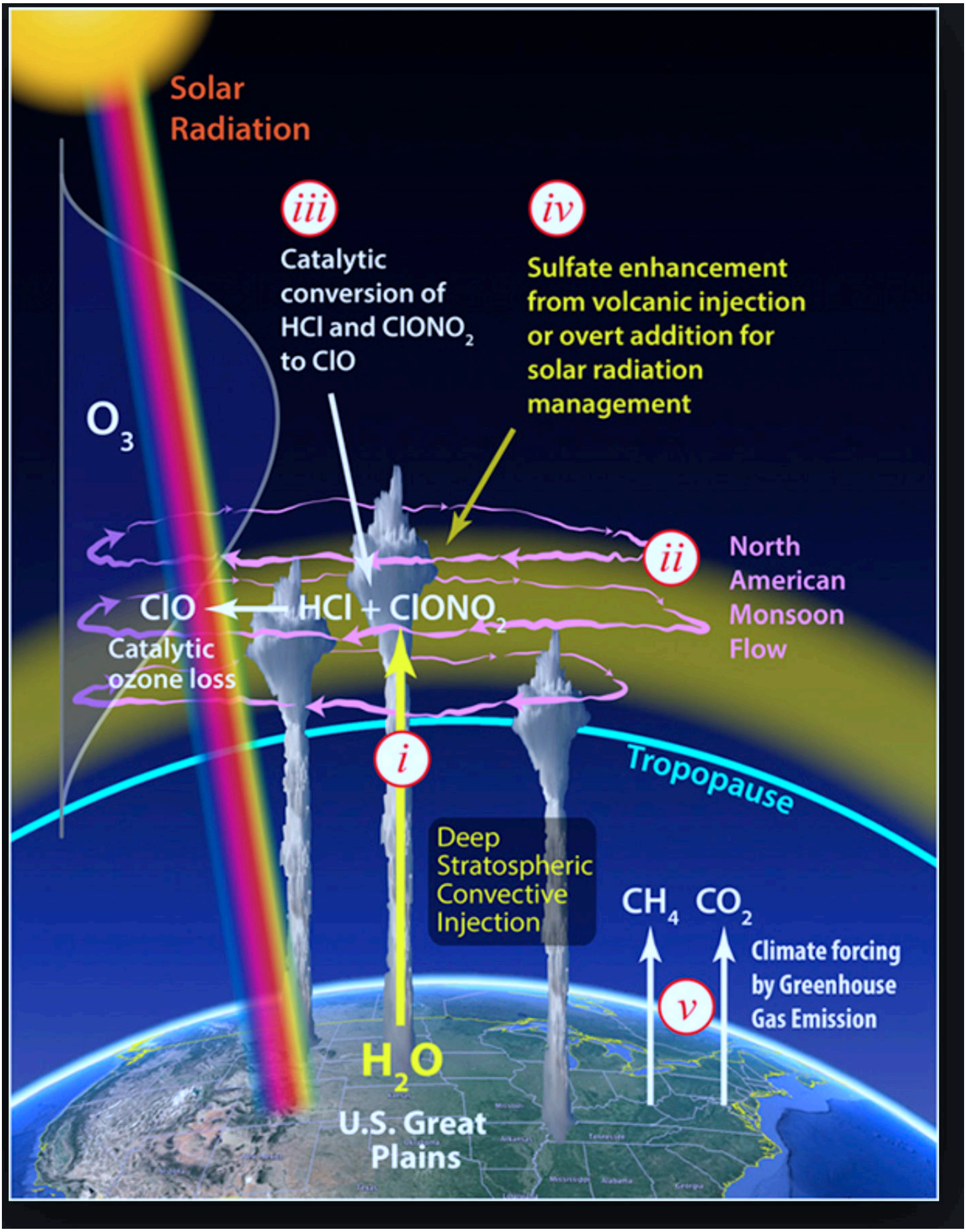

Space shuttle
Aurora lights
Meteorites
OZONE LAYER
400 km
80 km
50 km
8 km
Exosphere
Thermosphere
Mesosphere
Stratosphere
Troposphere
-100 -80 -60 -40 -20 0 20
Temperature (°C)


630 km
620 km
610 km
600 km
Exosphere
170 km
160 km
150 km
140 km
130 km
120 km
110 km
100 km
90 km
80 km
70 km
Ionosphere
60 km
50 km
40 km
30 km
20 km
10 km
Ozonosphere
Troposphere
Altitude
ระดับความสูง
-100
-50
0
50
100
150
200
...
500/1500
Temperature [celcius]

Earth's Atmosphere

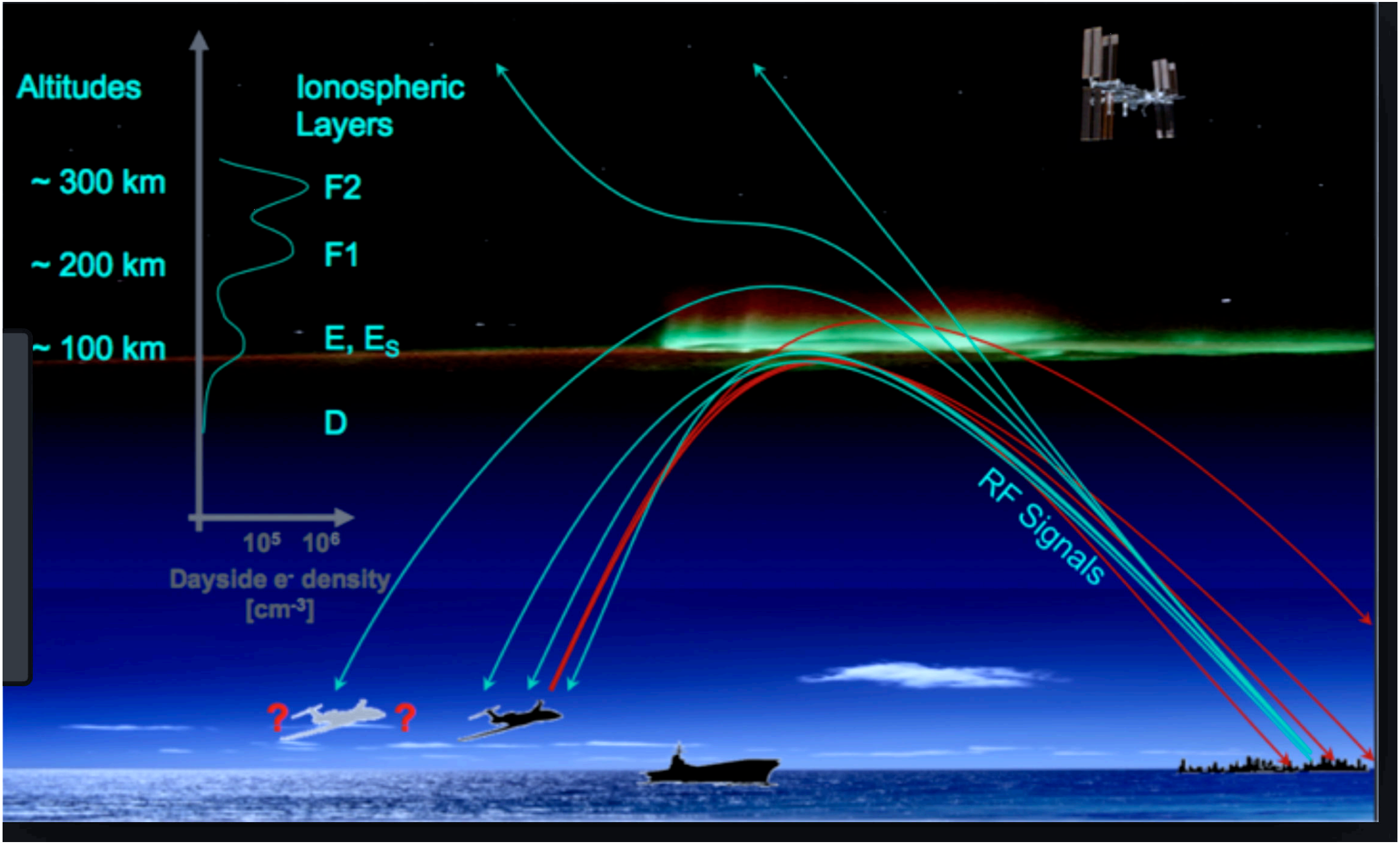


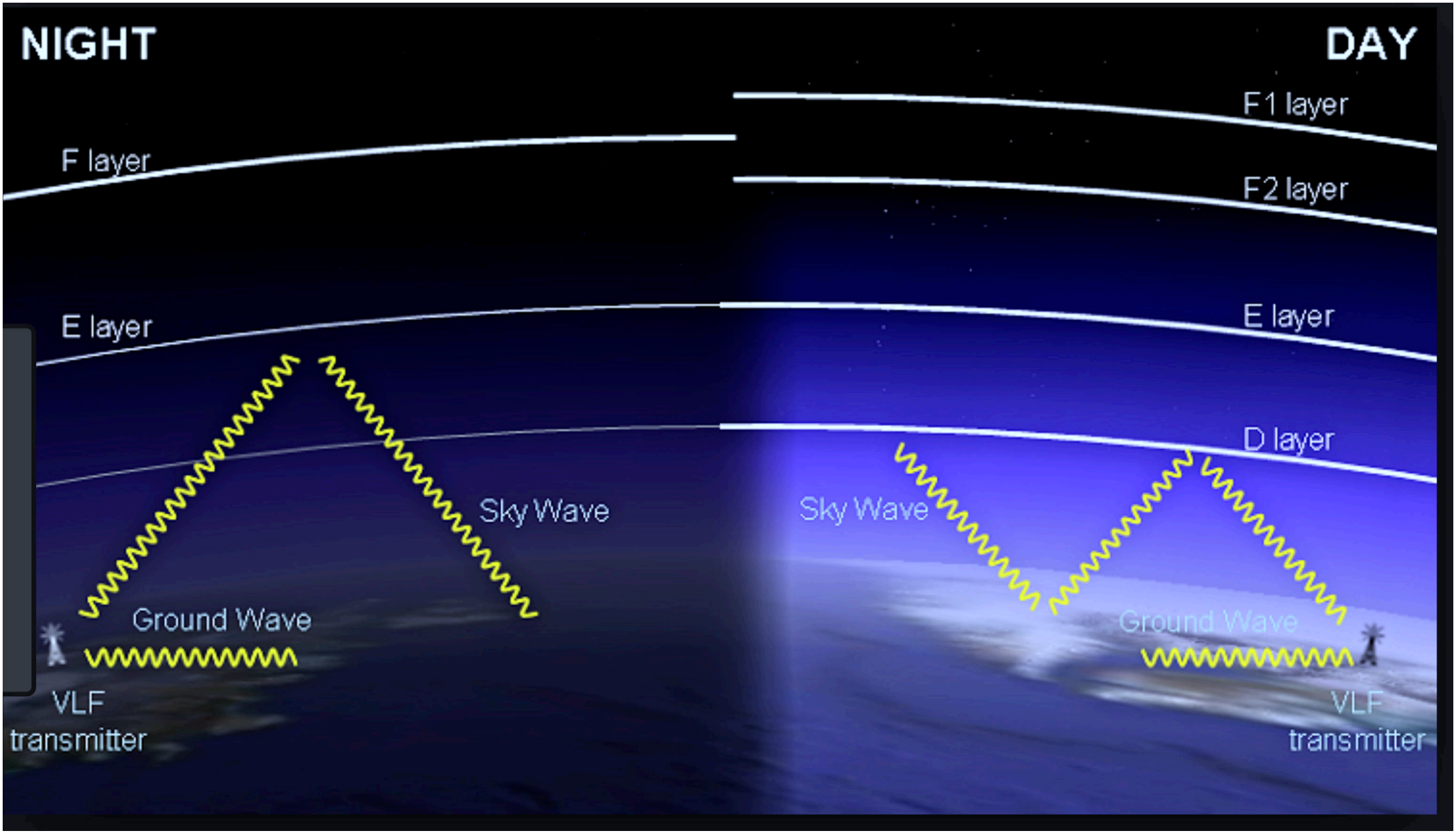

MAGNETOSPHERE
RADIATION
CHARGED PARTICLES
X-RAYS
EXTREME UV
ULTRAVIOLET
VISIBLE LIGHT
INFRARED
GALACTIC COSMIC RAYS
AURORAL PARTICLES
SOLAR PROTONS
THERMOSPHERE
IONOSPHERE
MESOPAUSE
MESOSPHERE
STRATOPAUSE
STRATOSPHERE
Gravity Waves Area Of Formation
TROPOPAUSE
TROPOSPHERE
ALTITUDE (km)
1000
500
200
100
50
20
10
200
300
500
1000
2000
3000
TEMPERATURE (°K)

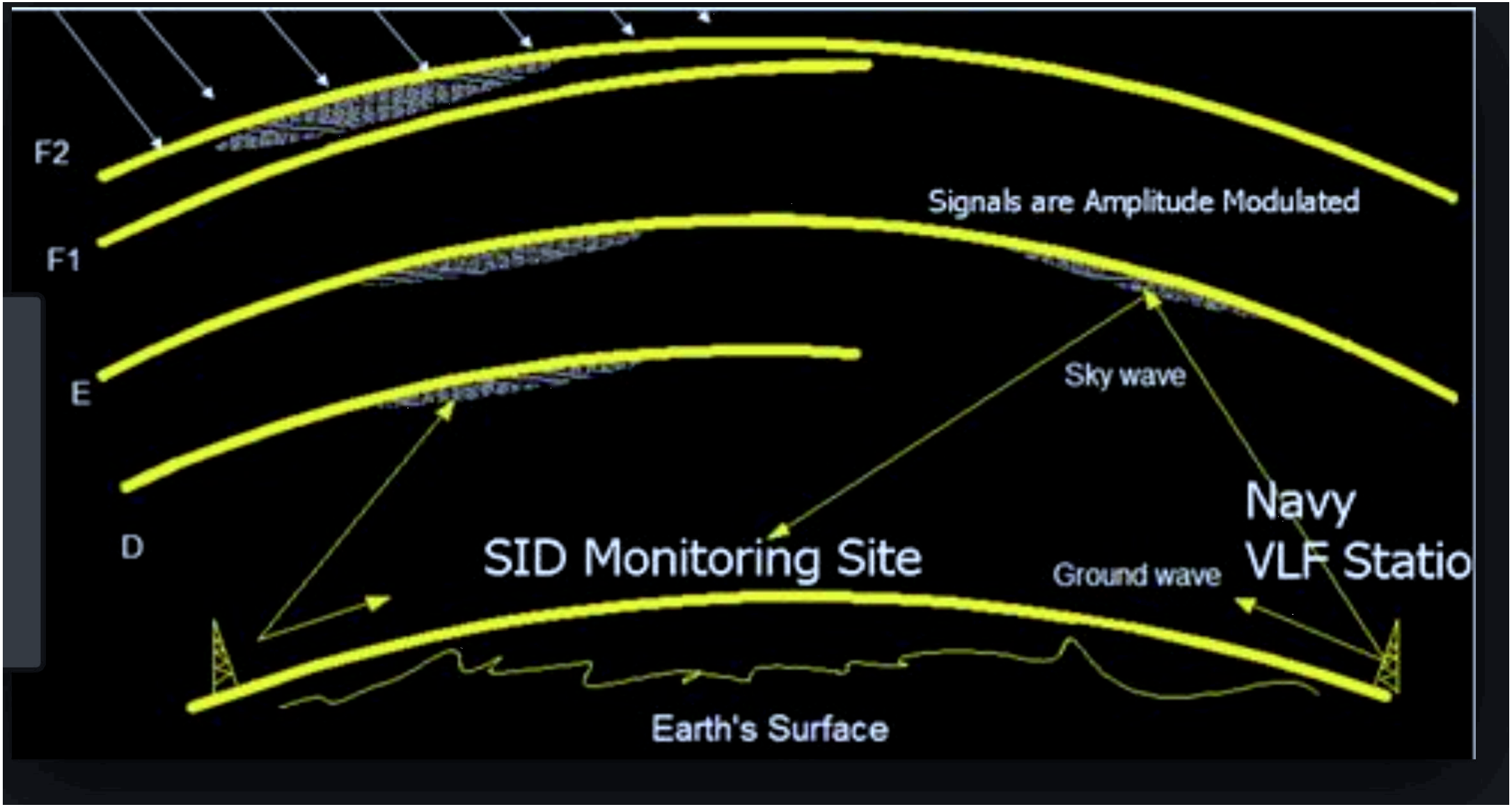

Solar Radiation
iii
Catalytic conversion of HCl and ClONO2 to ClO
iv
Sulfate enhancement from volcanic injection or overt addition for solar radiation management
O3
ii
North American Monsoon Flow
ClO ← HCl + ClONO2
Catalytic ozone loss
i
Tropopause
Deep Stratospheric Convective Injection
CH4 CO2
v
Climate forcing by Greenhouse Gas Emission
H2O
U.S. Great Plains

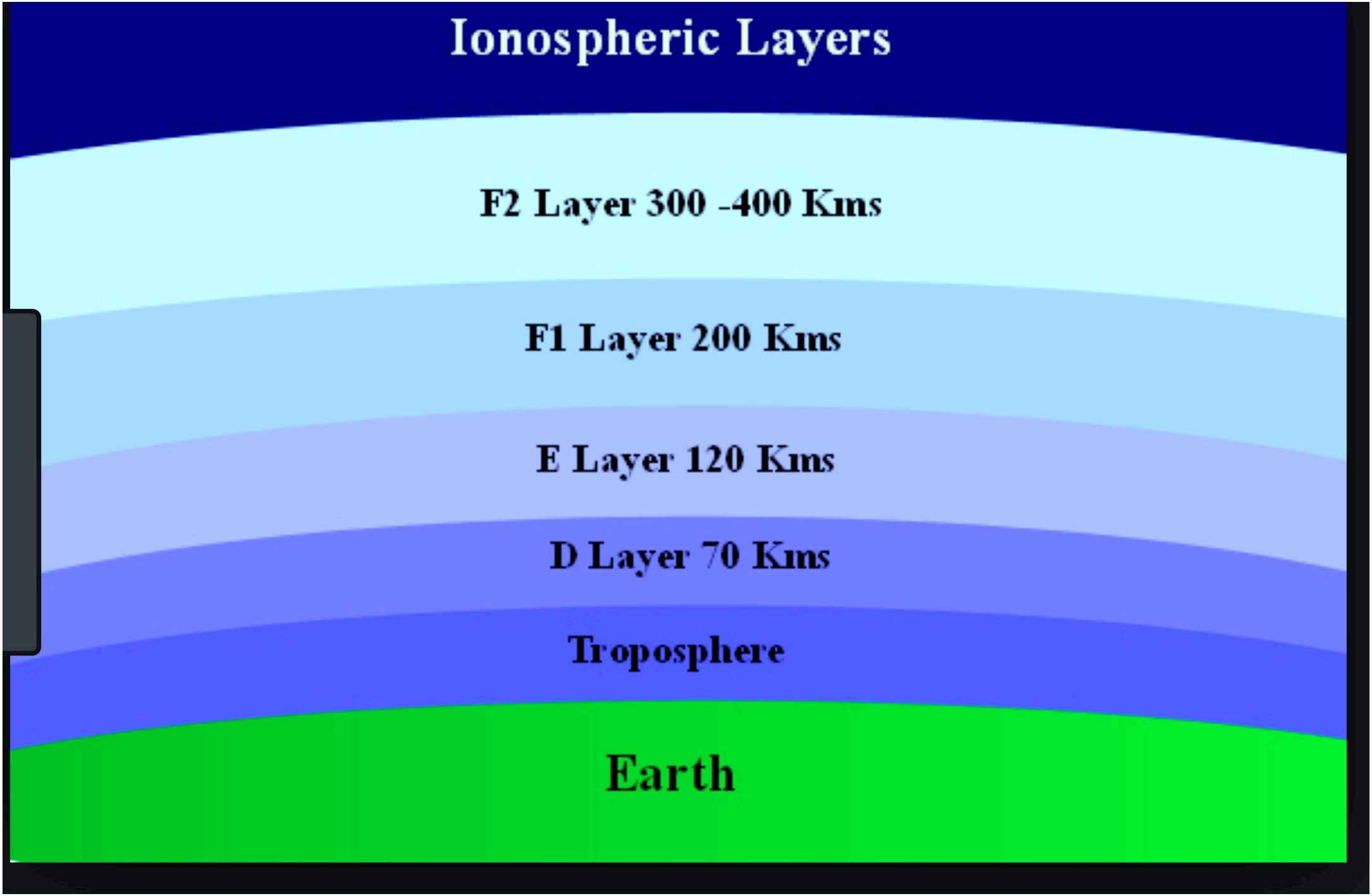
Gas	Symbol	Content	
Nitrogen	N_2	78.084%	99.998%
Oxygen	O_2	20.947%	
Argon	Ar	0.934%	
Carbon dioxide	CO_2	0.033%	
Neon	Ne	18.20 parts per million	
Helium	He	5.20 parts per million	
Krypton	Kr	1.10 parts per million	
Sulfur dioxide	SO_2	1.00 parts per million	
Methane	CH_4	2.00 parts per million	
Hydrogen	H_2	0.50 parts per million	
Nitrous oxide	N_2O	0.50 parts per million	
Xenon	Xe	0.09 parts per million	
Ozone	O_3	0.07 parts per million	
Nitrogen dioxide	NO_2	0.02 parts per million	
Iodine	I_2	0.01 parts per million	
Carbon monoxide	CO	trace	
Ammonia	NH_3	trace	

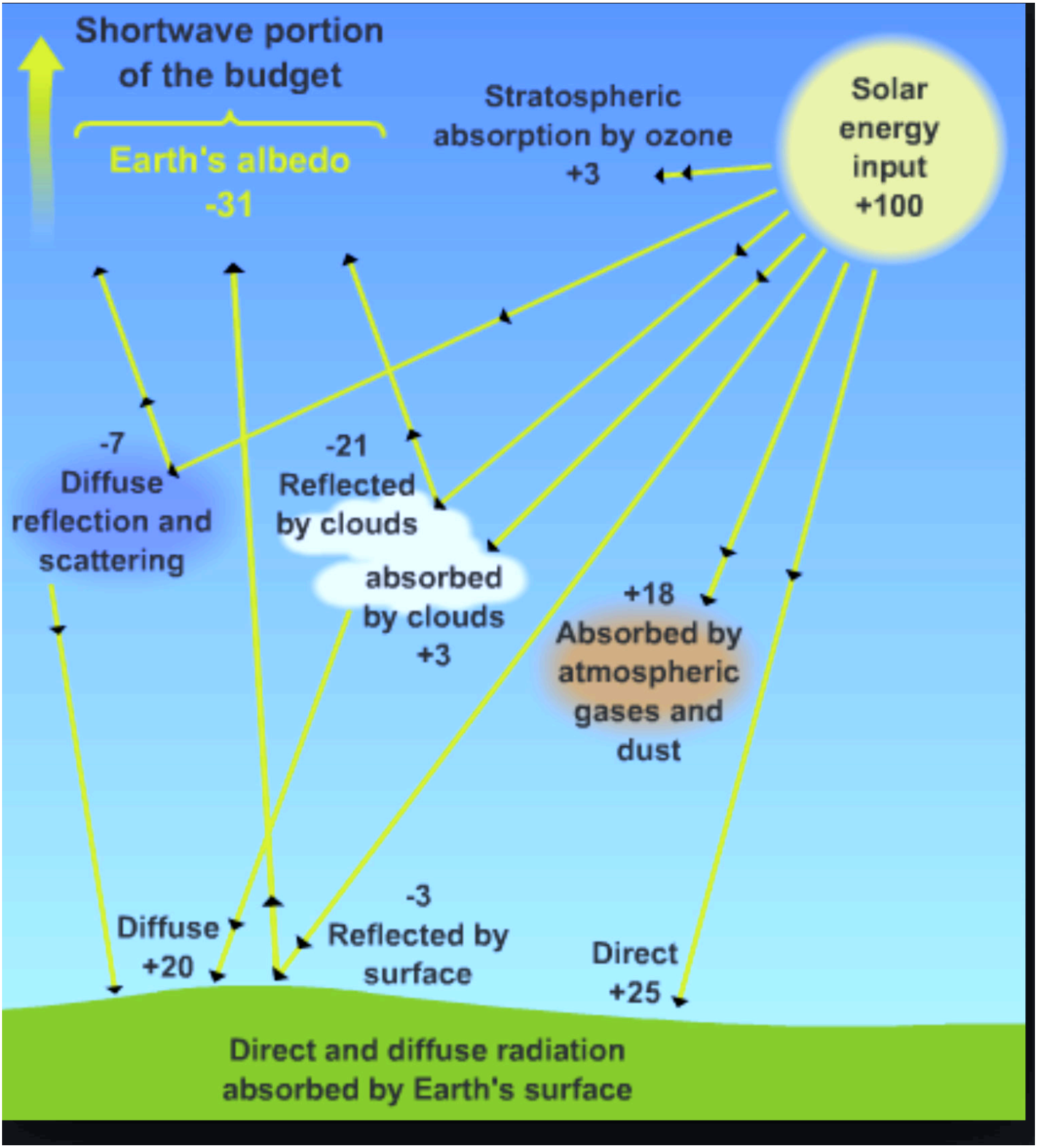
Gases	% by volume	Comments
Constant gases		
Nitrogen, N_2	78.08%	Photochemical dissociation high in the ionosphere; mixed at lower levels
Oxygen, O_2	20.95%	Photochemical dissociation above 95 km; mixed at lower levels
Argon, Ar	0.93%	Mixed up to 110 km
Neon, Ne	0.0018%	Mixed in most of the middle atmosphere
Helium, He	0.0005%	
Krypton, Kr	0.00011%	
Xenon, Xe	0.000009%	
Variable gases		
Water vapor, H_2O	4.0% (maximum, in the tropics) 0.00001%(minimum, at the South Pole)	Highly variable; photodissociates above 80 km dissociation
Carbon dioxide, CO_2	0.0365% (increasing ~0.4% per year)	Slightly variable; mixed up to 100 km; photodissociates above
Methane, CH_4	~0.00018% (increases due to agriculture)	Mixed in troposphere; dissociates in mesosphere
Hydrogen, H_2	~0.00006%	Variable photochemical product; decreases slightly with height in the middle atmosphere
Nitrous oxide, N_2O	~0.00003%	Slightly variable at surface; dissociates in stratosphere and mesosphere
Carbon monoxide, CO	~0.000009%	Variable
Ozone, O_3	~0.000001% - 0.0004%	Highly variable; photochemical origin
Fluorocarbon 12, CF_2Cl_2	~0.00000005%	Mixed in troposphere; dissociates in stratosphere

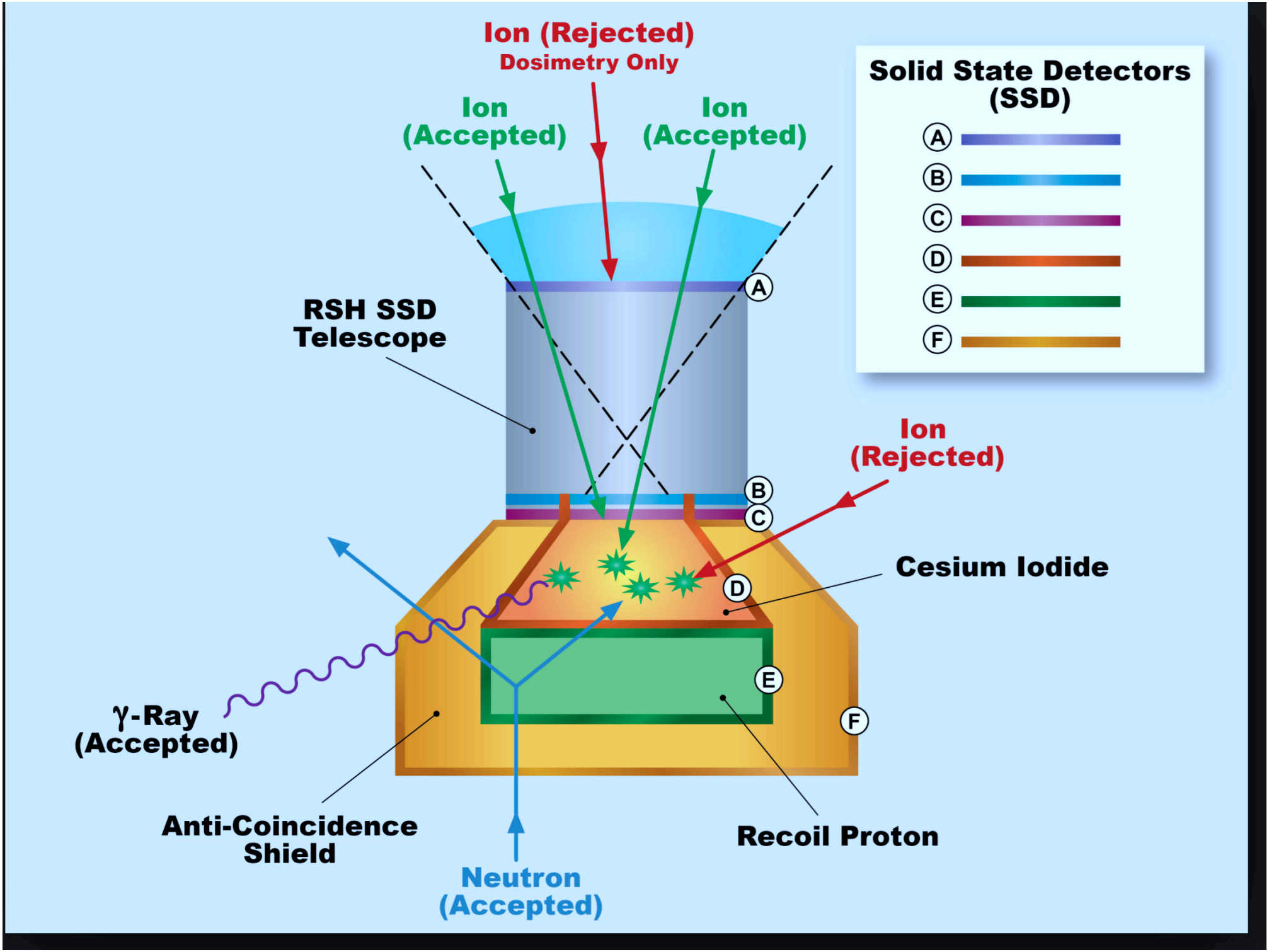

Altitudes
~ 300 km
~ 200 km
~ 100 km
Ionospheric Layers
F2
F1
E, Es
D
10^5 10^6
Dayside e- density [cm-3]
RF Signals
?
?

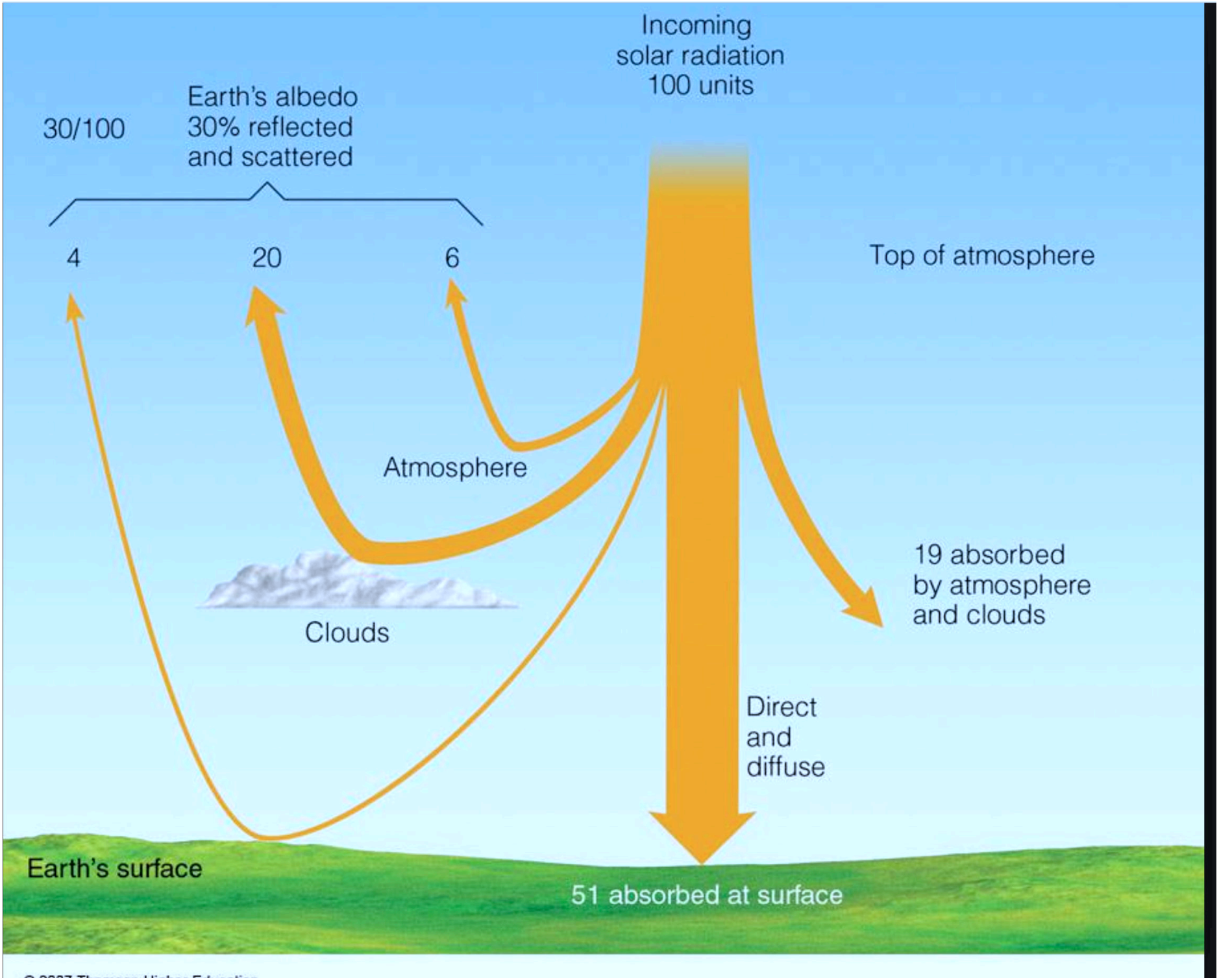

NIGHT
DAY
F layer
F1 layer
F2 layer
E layer
E layer
D layer
Sky Wave
Sky Wave
Ground Wave
Ground Wave
VLF
transmitter
VLF
transmitter

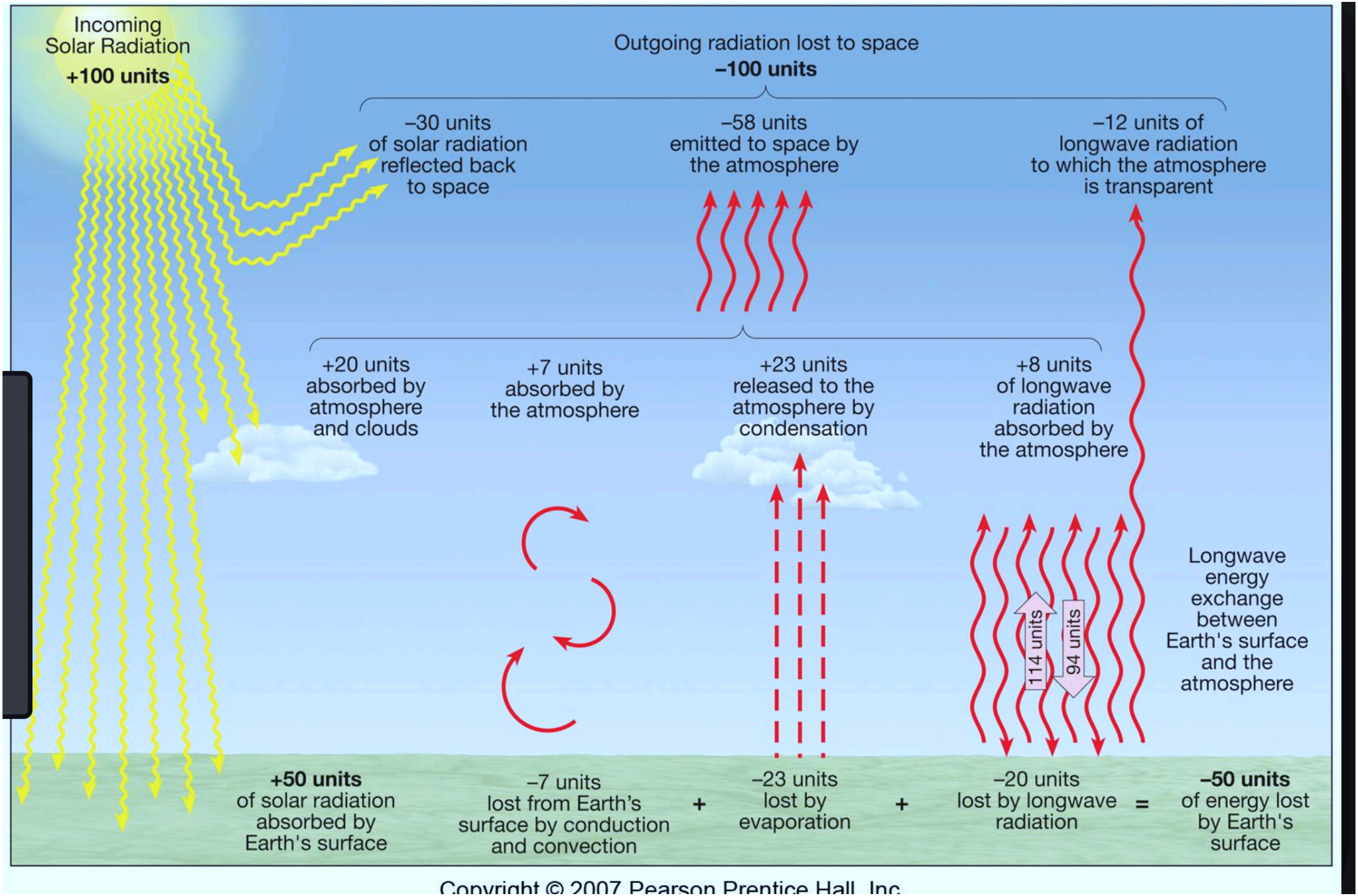

F2
F1
E
D
Signals are Amplitude Modulated
Sky wave
SID Monitoring Site
Ground wave
Navy
VLF Statio
Earth's Surface


Ionospheric Layers
F2 Layer 300 -400 Kms
F1 Layer 200 Kms
E Layer 120 Kms
D Layer 70 Kms
Troposphere
Earth


Shortwave portion of the budget
Earth's albedo
-31
Stratospheric absorption by ozone
+3
Solar energy input
+100
-7
Diffuse reflection and scattering
-21
Reflected by clouds
absorbed by clouds
+3
+18
Absorbed by atmospheric gases and dust
Diffuse
+20
-3
Reflected by surface
Direct
+25
Direct and diffuse radiation absorbed by Earth's surface


Ion (Rejected)
Dosimetry Only
Ion
(Accepted)
Ion
(Accepted)
Solid State Detectors
(SSD)
A
B
C
D
E
F
RSH SSD
Telescope
Ion
(Rejected)
Cesium Iodide
γ-Ray
(Accepted)
Anti-Coincidence
Shield
Neutron
(Accepted)
Recoil Proton


Incoming
solar radiation
100 units
Earth's albedo
30% reflected
and scattered
30/100
4
20
6
Top of atmosphere
Atmosphere
Clouds
19 absorbed
by atmosphere
and clouds
Direct
and
diffuse
Earth's surface
51 absorbed at surface



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Even though residents of Barrow, the northernmost town in Alaska, won't see the sun for 67 days come winter, they enjoy the **midnight** sun all summer - over 80 days of uninterrupted daylight.

Shortest Day In Alaska | Hours of Daylight & Winter Darkness Fun Facts
www.alaska.org/advice/shortest-day-in-alaska

About this result Feedback

People also ask

What months of the year is it dark in Alaska?

How many hours of night does Alaska have?

That depends on where in Alaska you live. The farther north you go, the longer the day. Just north of Fairbanks, the day is **24 hours** long. In Fairbanks, there are nearly **22 hours** of daylight, about **19.5 hours** in Anchorage and **18.2 hours** in Juneau.
Jun 19, 2015

As solstice approaches, a look at why Alaska has the most daylight ...
https://www.adn.com/science/article/sunniest-day-year-look...alaska-has...daylight/.../20/

Search for: How many hours of night does Alaska have?

Does Alaska have 6 months day and 6 months night?

Why does Alaska have 24 hours daylight?

Around the summer solstice (approximately 21 June in the Northern Hemisphere and 22 December in the Southern Hemisphere), the sun is visible for the full **24 hours**, given fair weather. The number of days per year with potential midnight sun increases the closer towards either pole one goes.

Midnight sun - Wikipedia
https://en.m.wikipedia.org/wiki/Midnight_sun

Search for: Why does Alaska have 24 hours daylight?

Why is it dark in Alaska for 6 months?

What is the most common job in Alaska?

How much do you get paid to live in Alaska 2018?

Which country has 6 month day and six month night?

What is the best month to go to Alaska on a cruise?

What is the best time of year to go to Alaska?

What are the average monthly temperatures in Alaska?

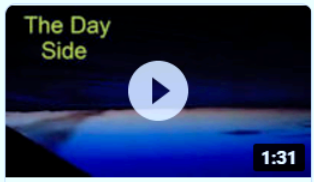
Why is Alaska dark for half the year?

Feedback

Videos

Alaska Cruise - Night & Day at the same time!

Denise King

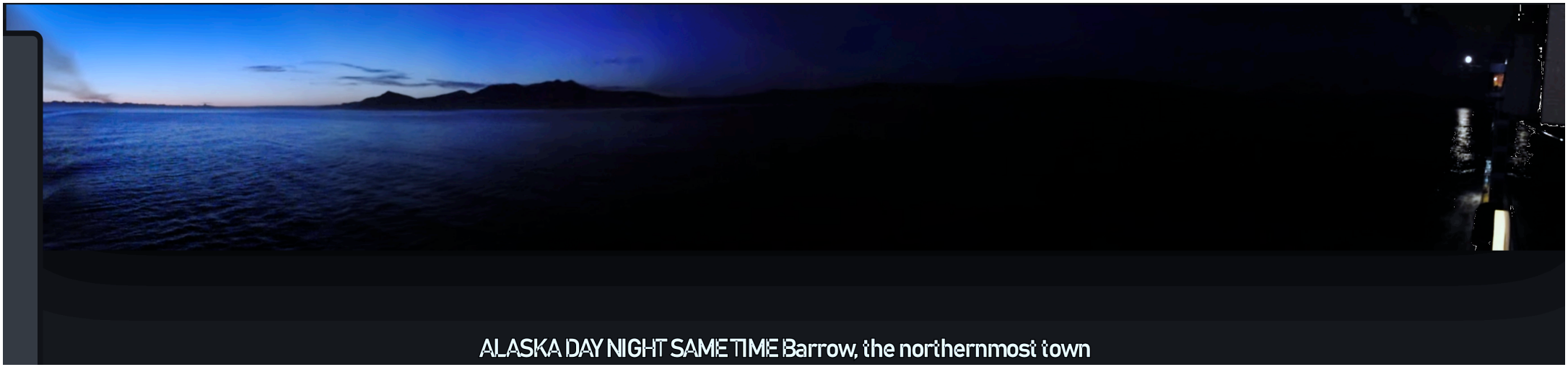


Best Alaska Cruise | When you live Night and Day in the same ...

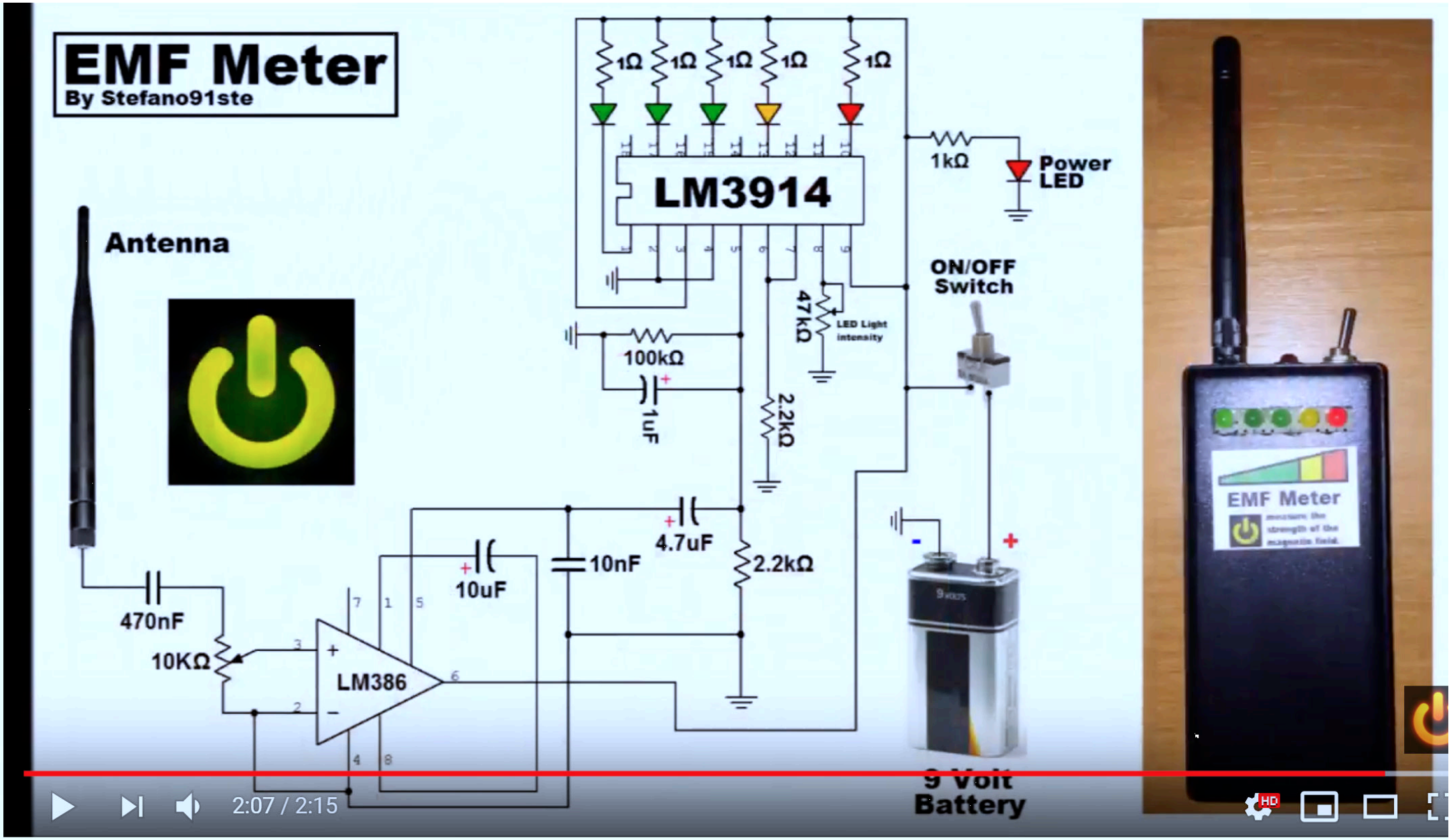
The Lost suvival ways

24 hours of daylight | 11am to 2am : Barrow Alaska | Top of The World

BourgeoisPhotography

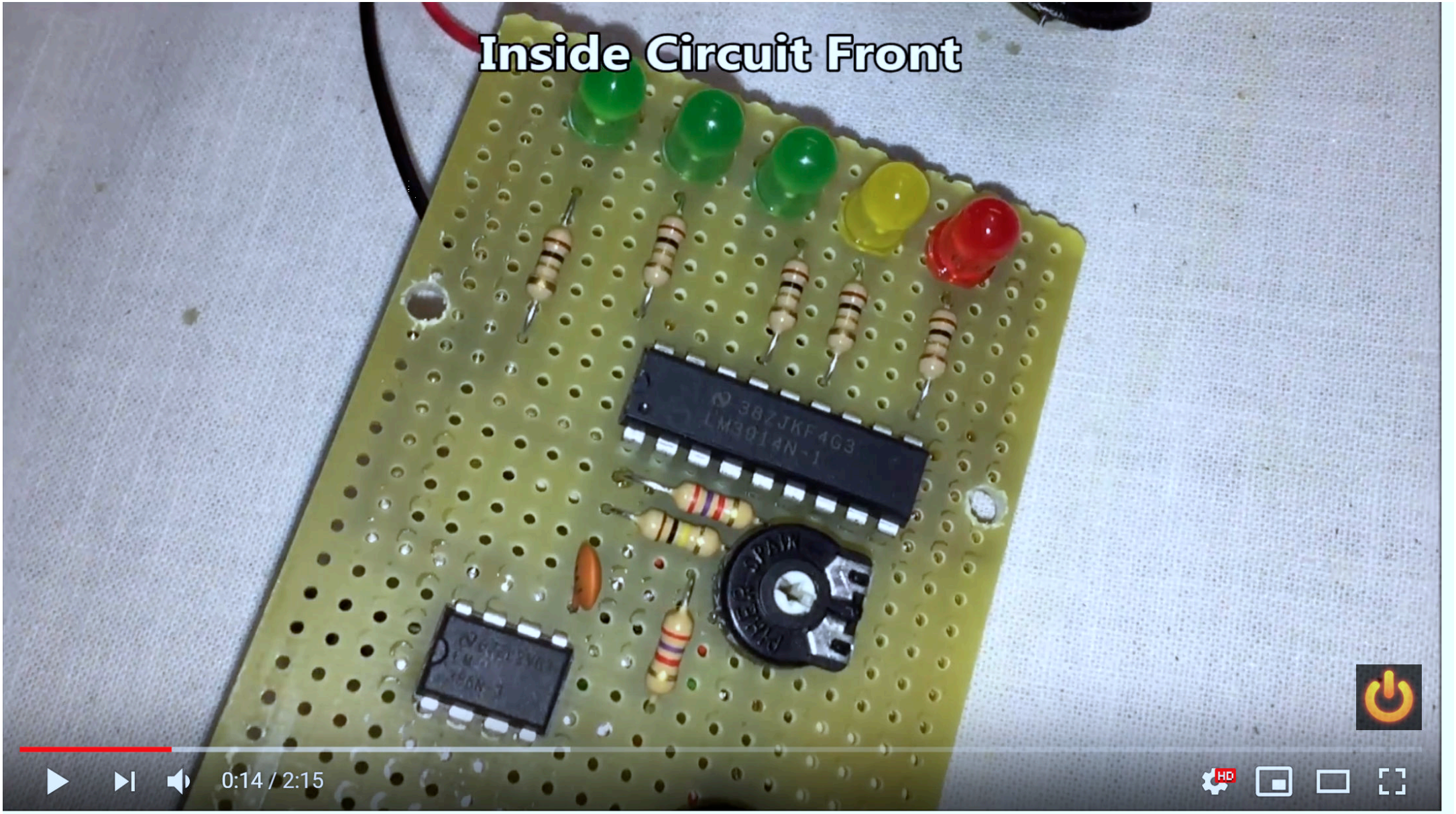


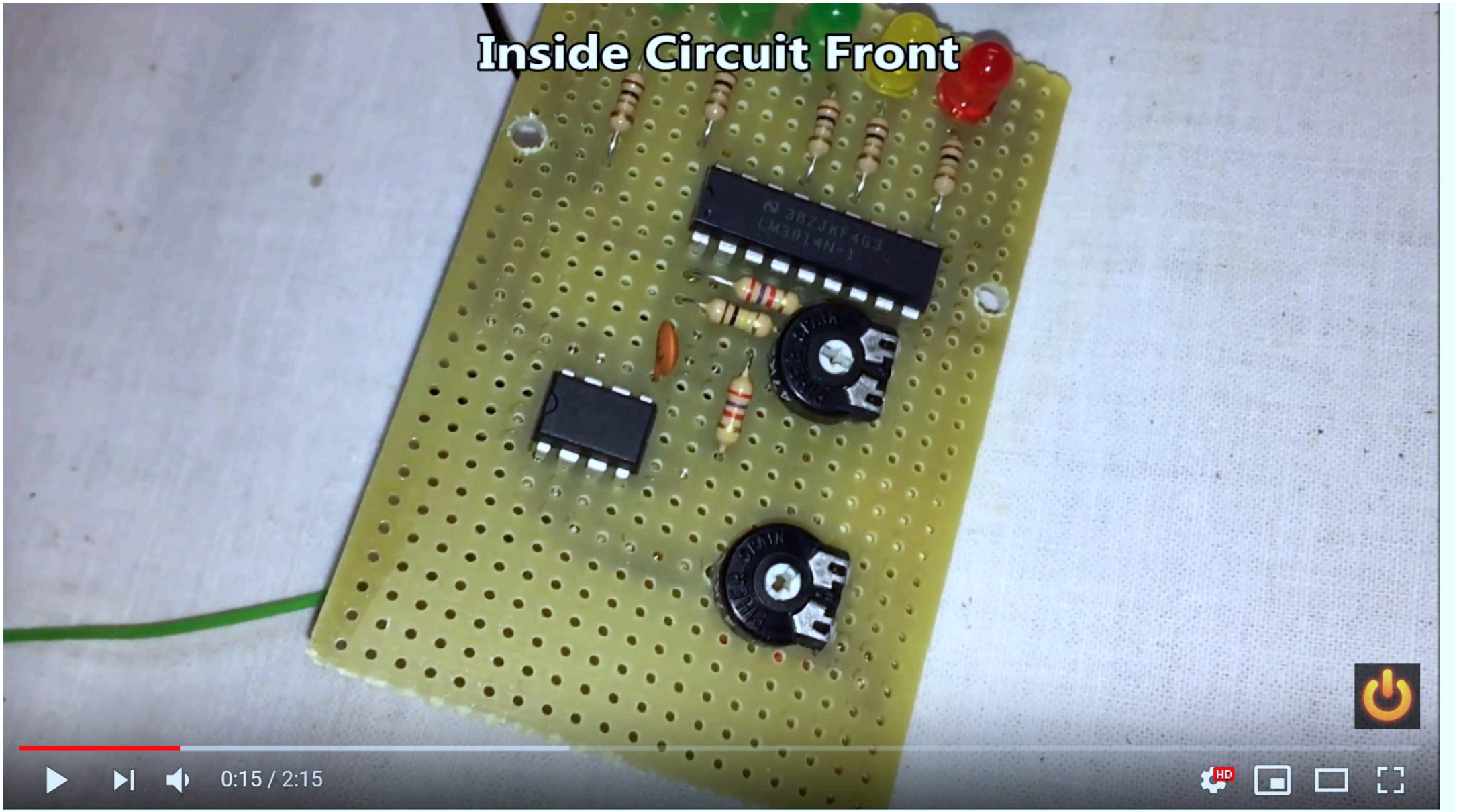
ALASKA DAY NIGHT SAME TIME Barrow, the northernmost town

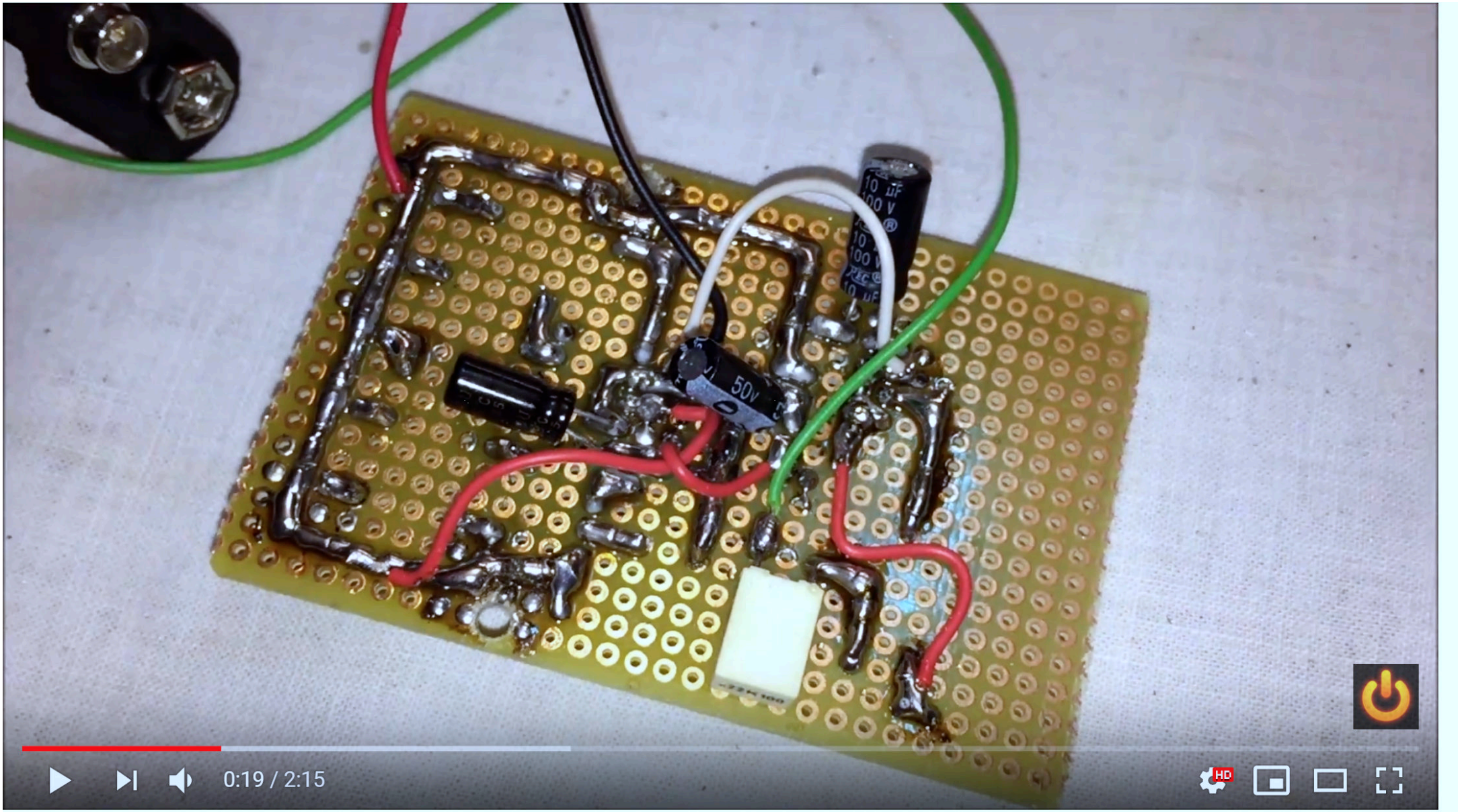


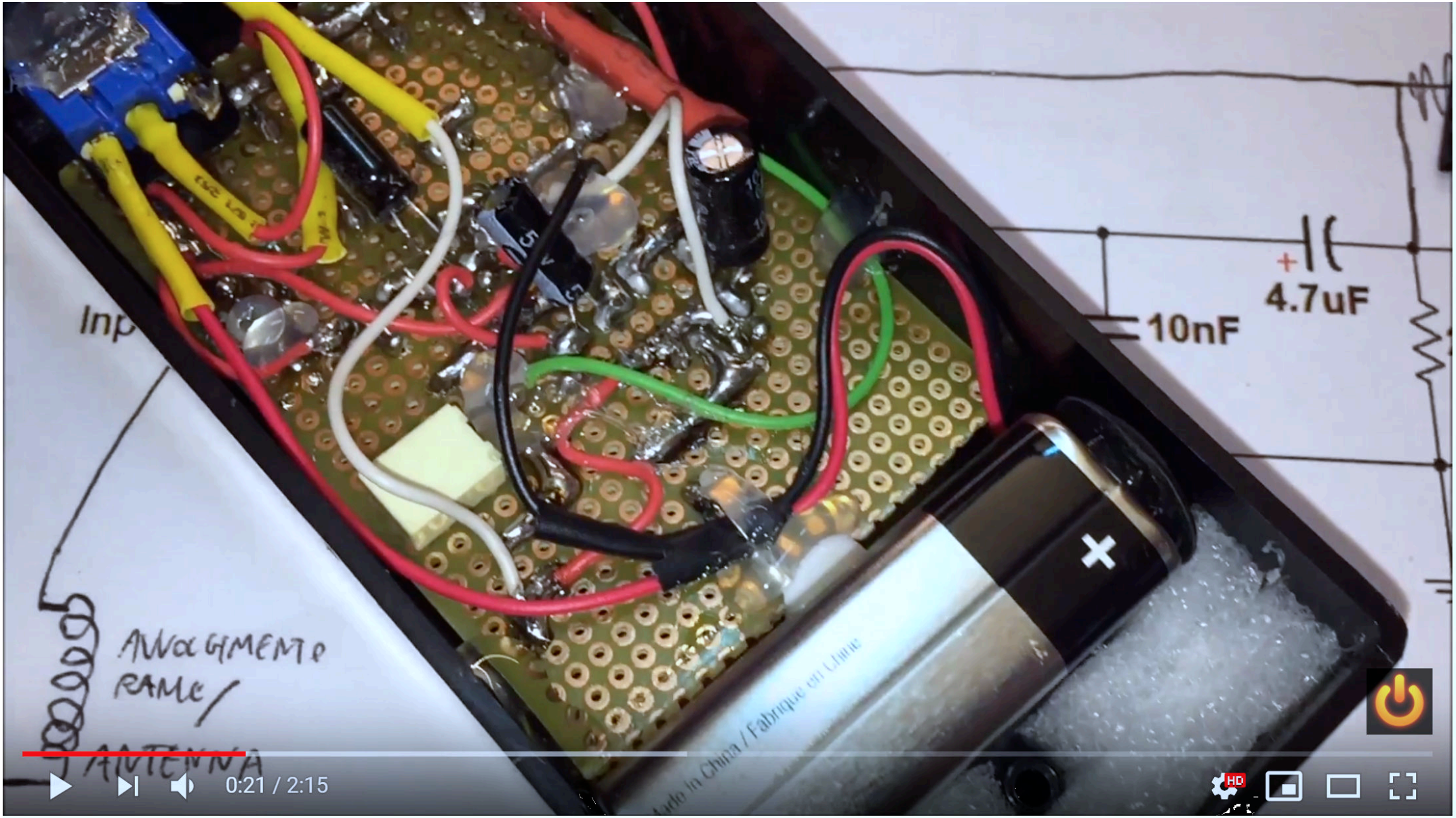
#ElectronicProjects #Electronic #EMF

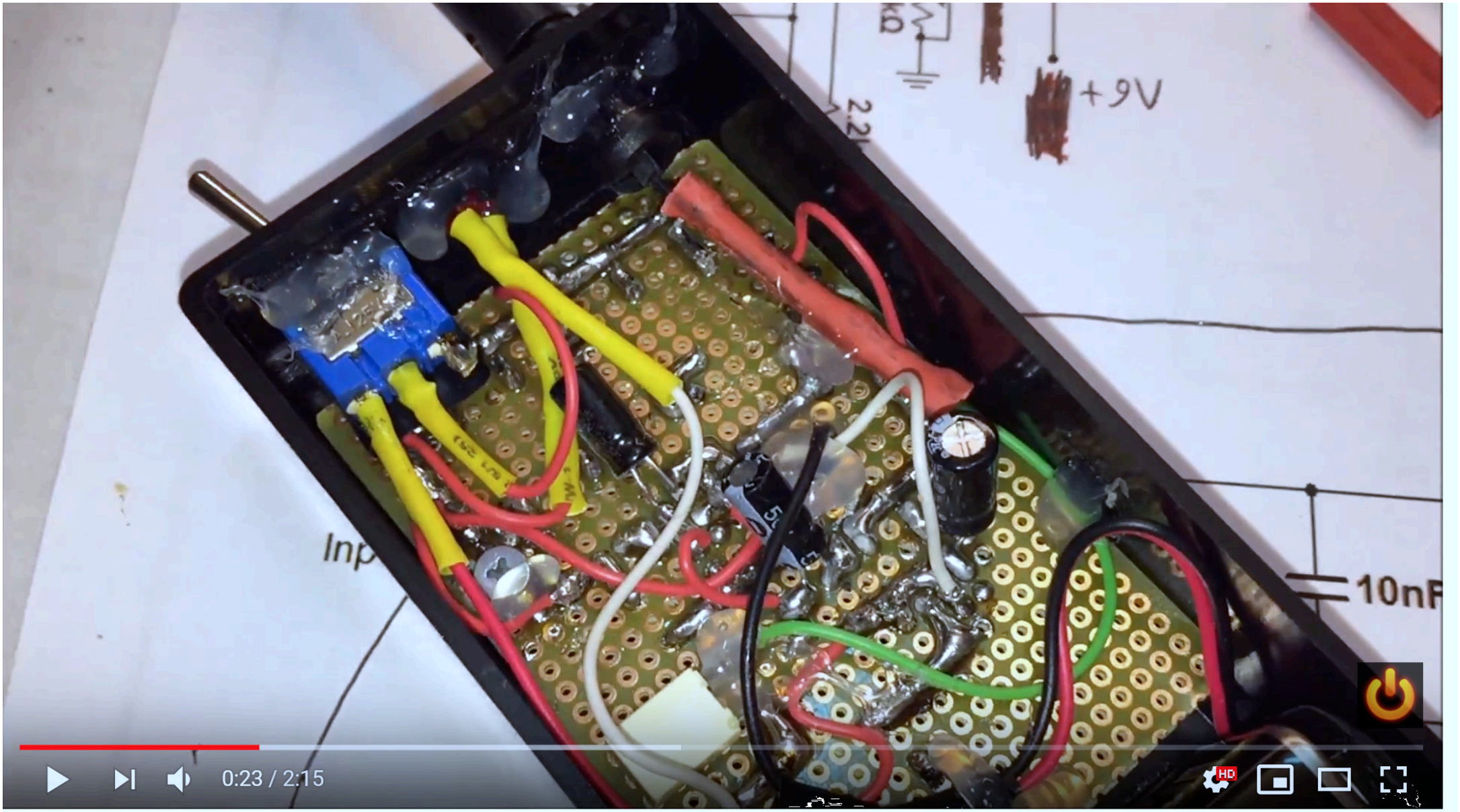
EMF Meter - Detector (DIY) - Electromagnetic fields meter - By STE


Inside Circuit Front
38ZJKF4G3
LM3914N-1
0:14 / 2:15

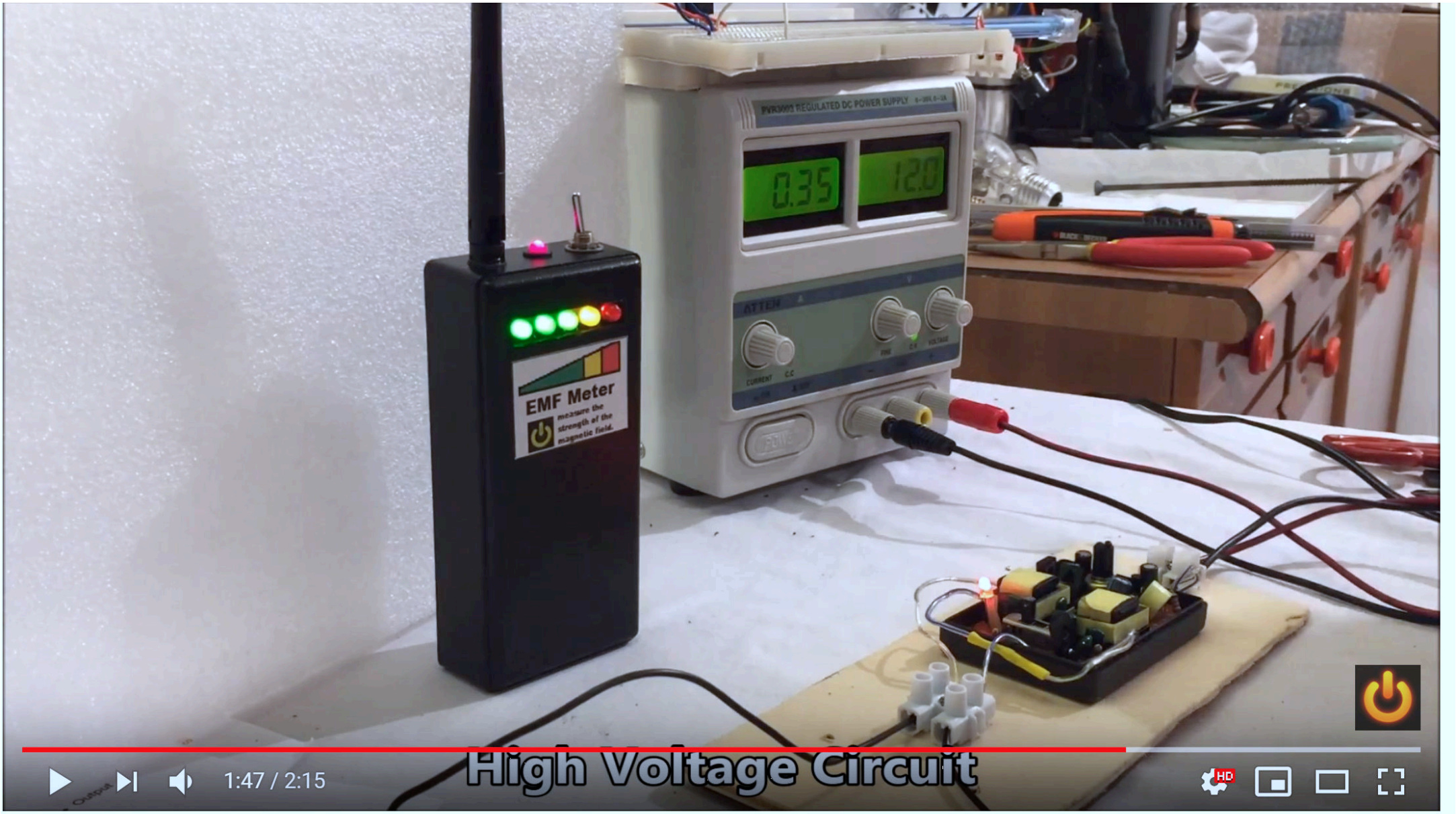

Inside Circuit Front
LM3914N-1
0:15 / 2:15

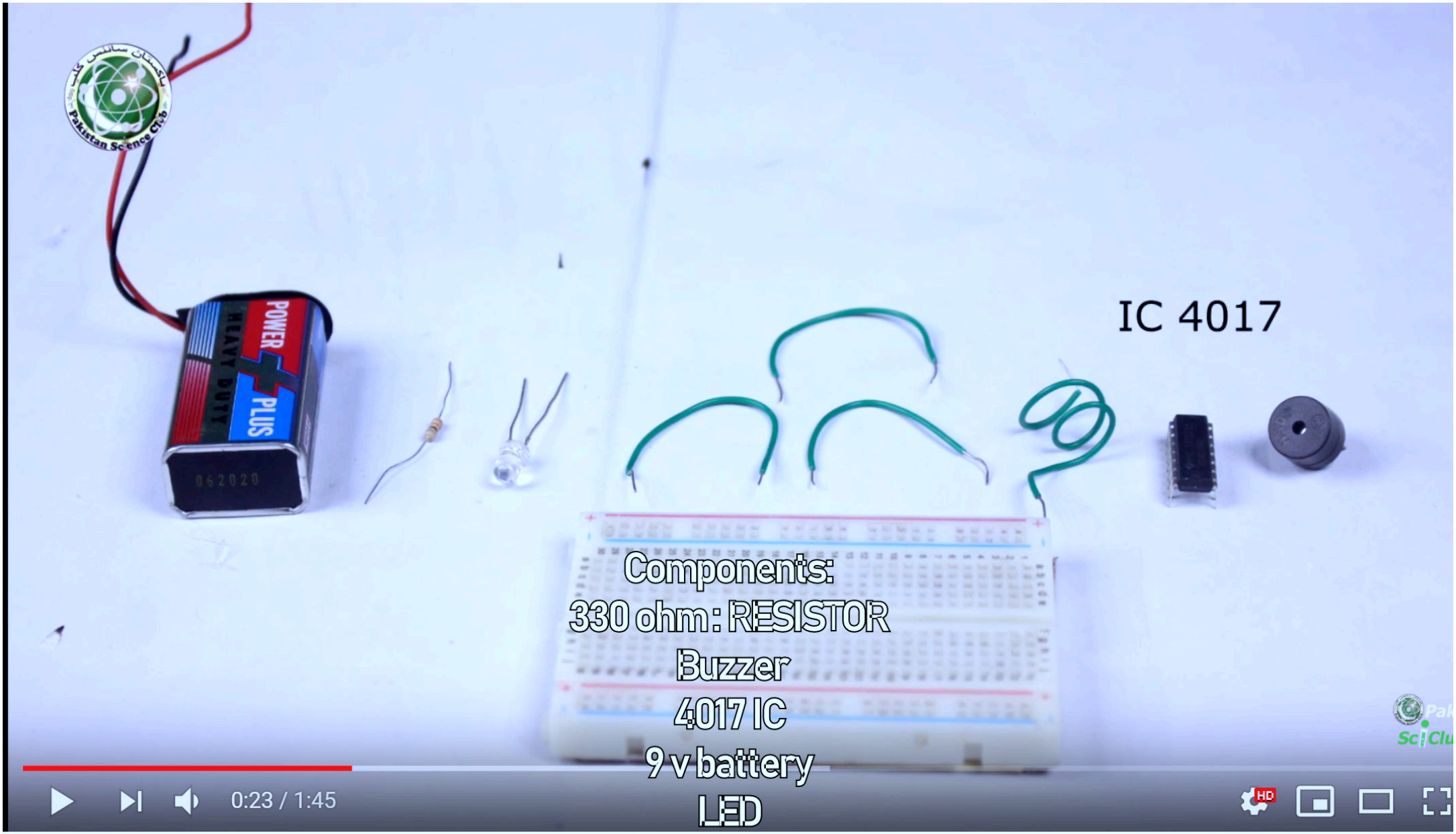

10 µF
100 V
50V
0:19 / 2:15


4.7uF
10nF
AVVOLGIMENTO
RAME /
ANTENNA
0:21 / 2:15


+9V
10nF
0:23 / 2:15

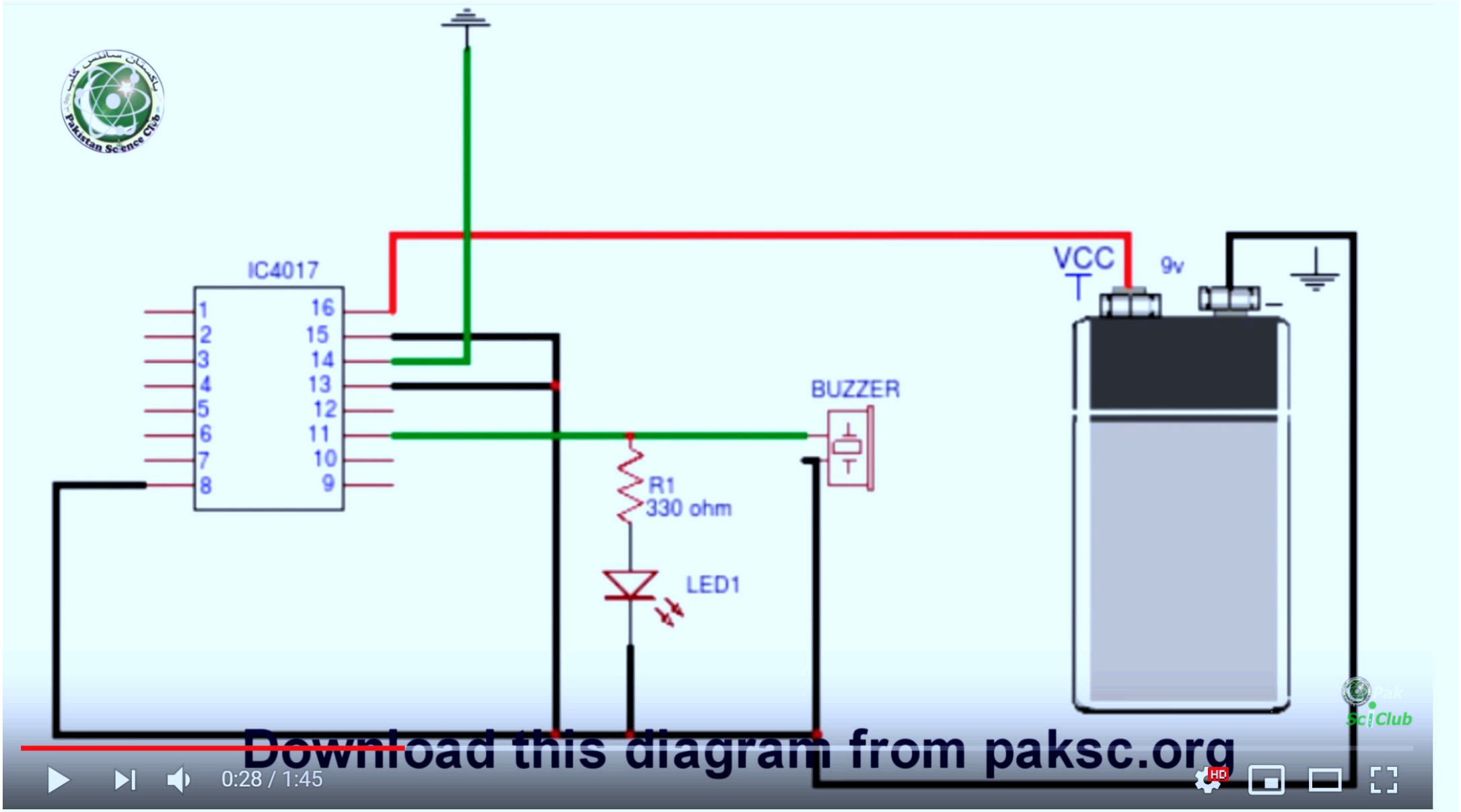
EMF Meter
measure the
strength of the
magnetic field.
0:53 / 2:15

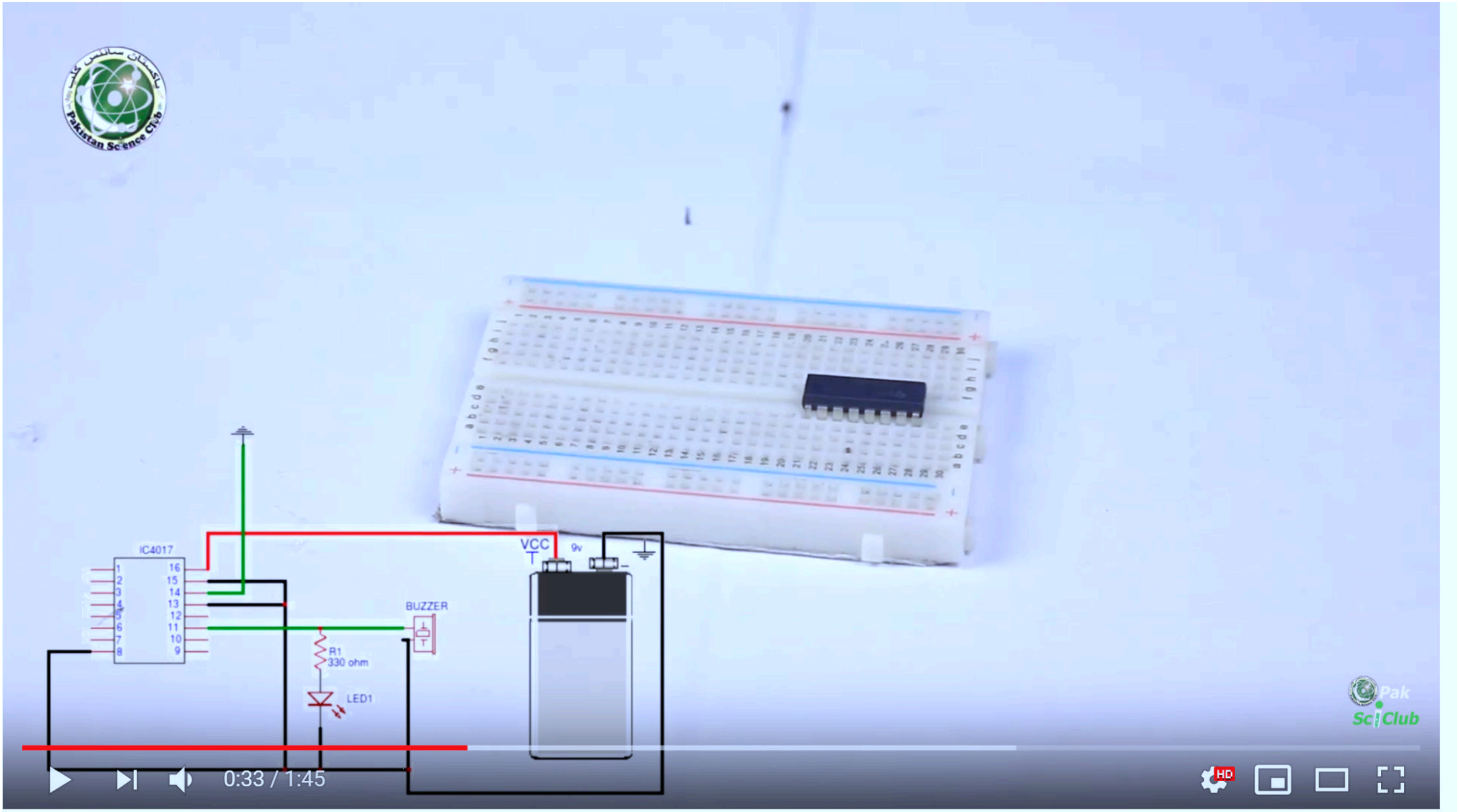

EMF Meter
measure the strength of the magnetic field.
0.35
12.0
1:47 / 2:15
High Voltage Circuit

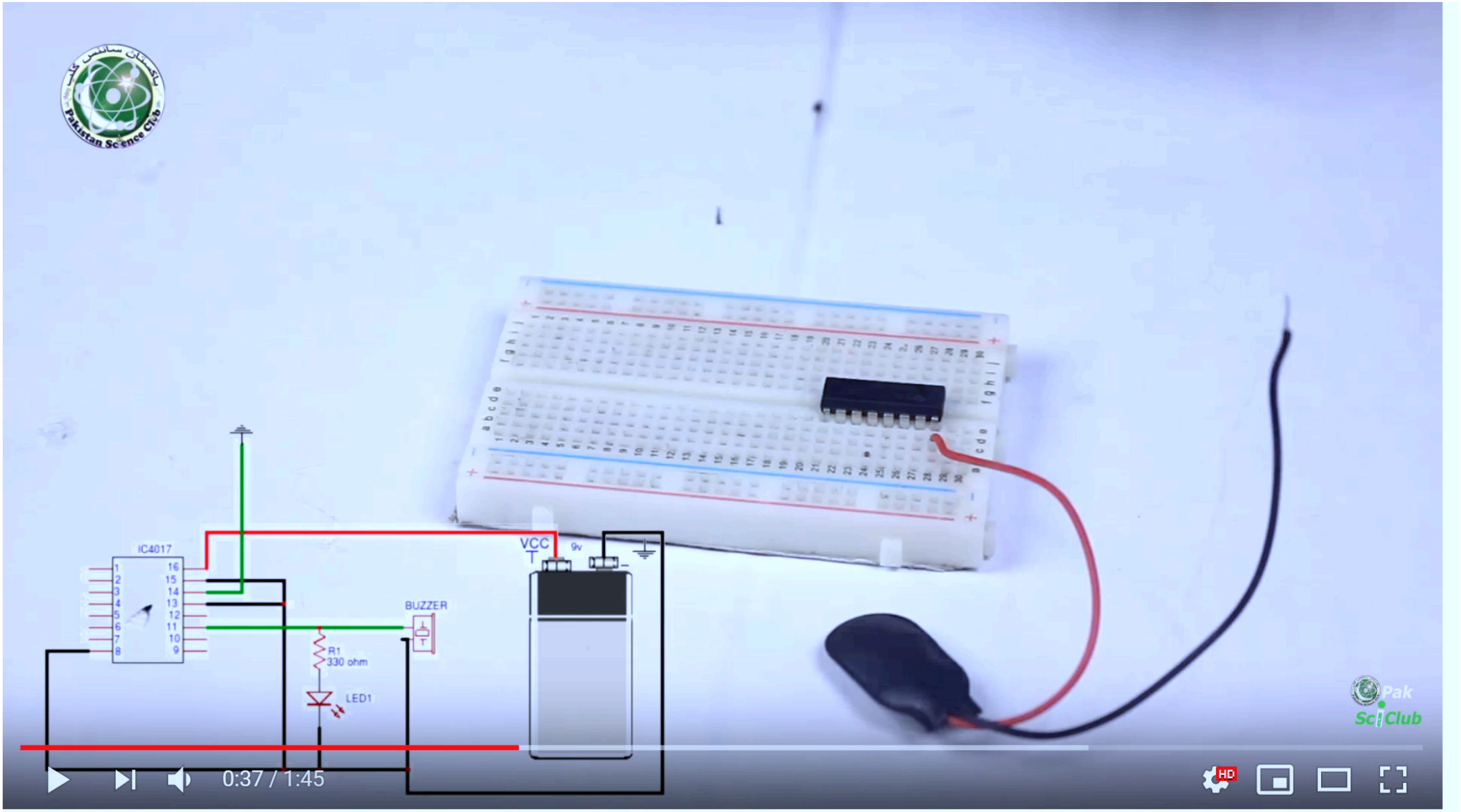


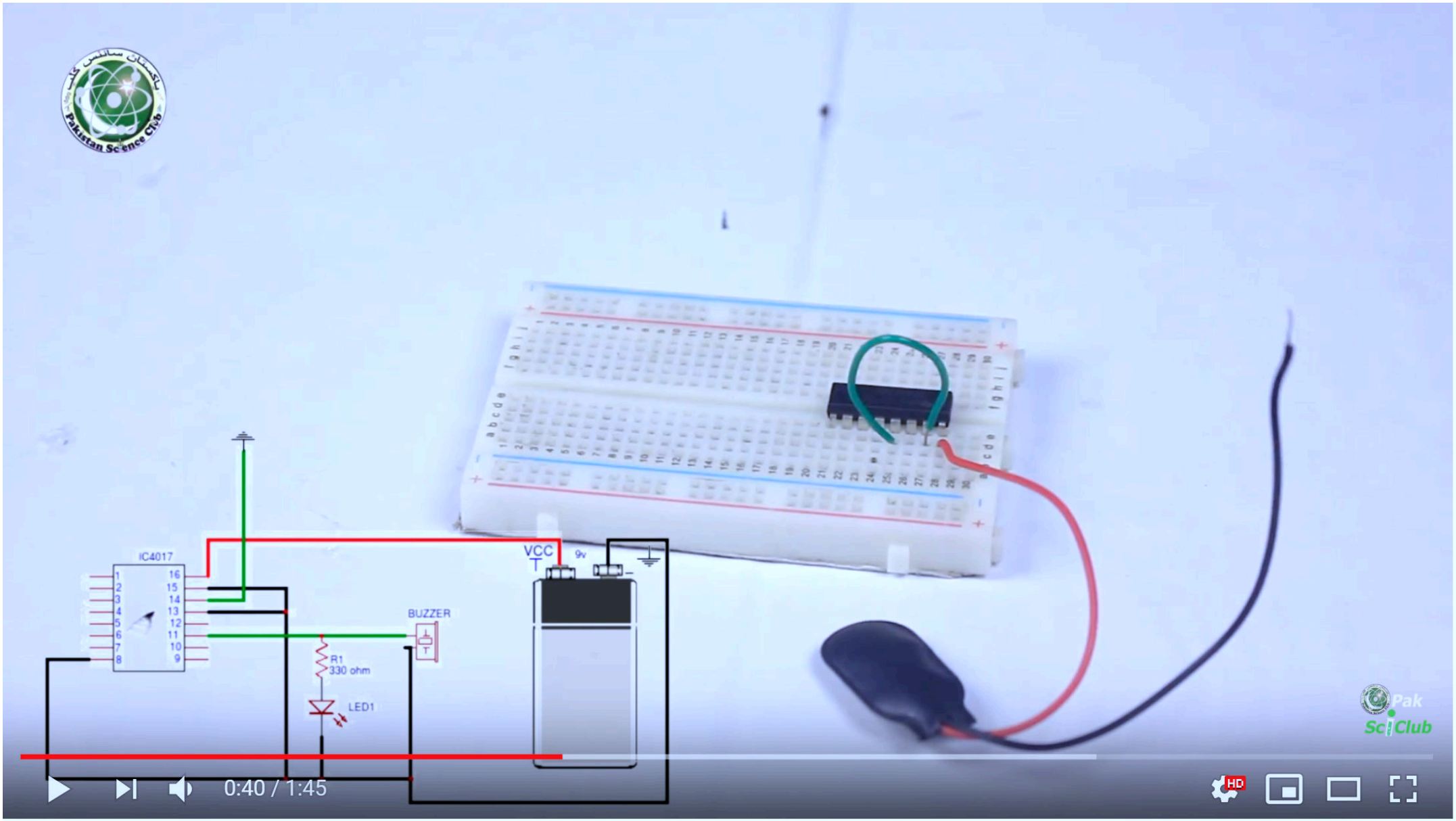
#EMFDetector #ElectronicsProjects

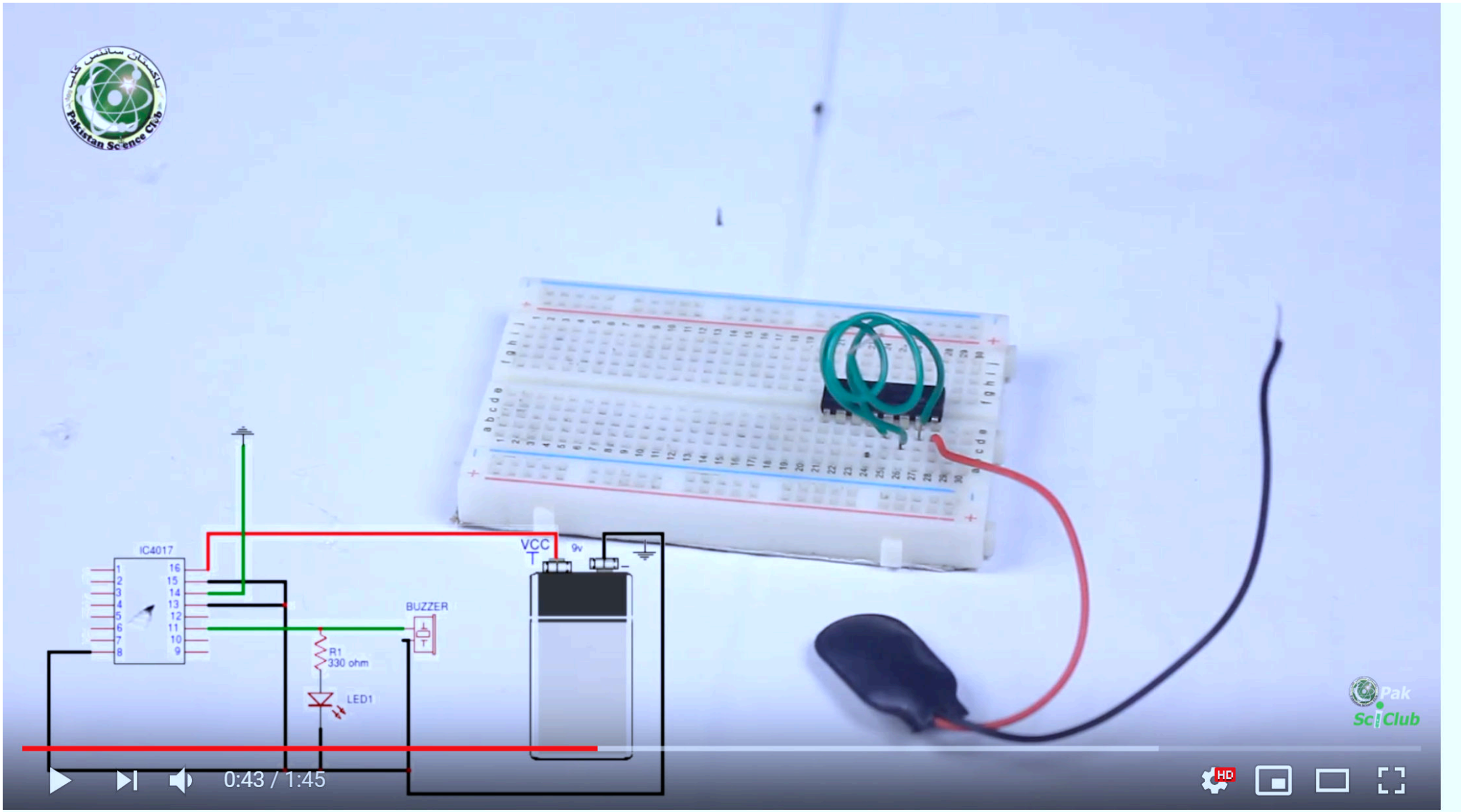
How to build EMF Detector with Very Easy emf circuit

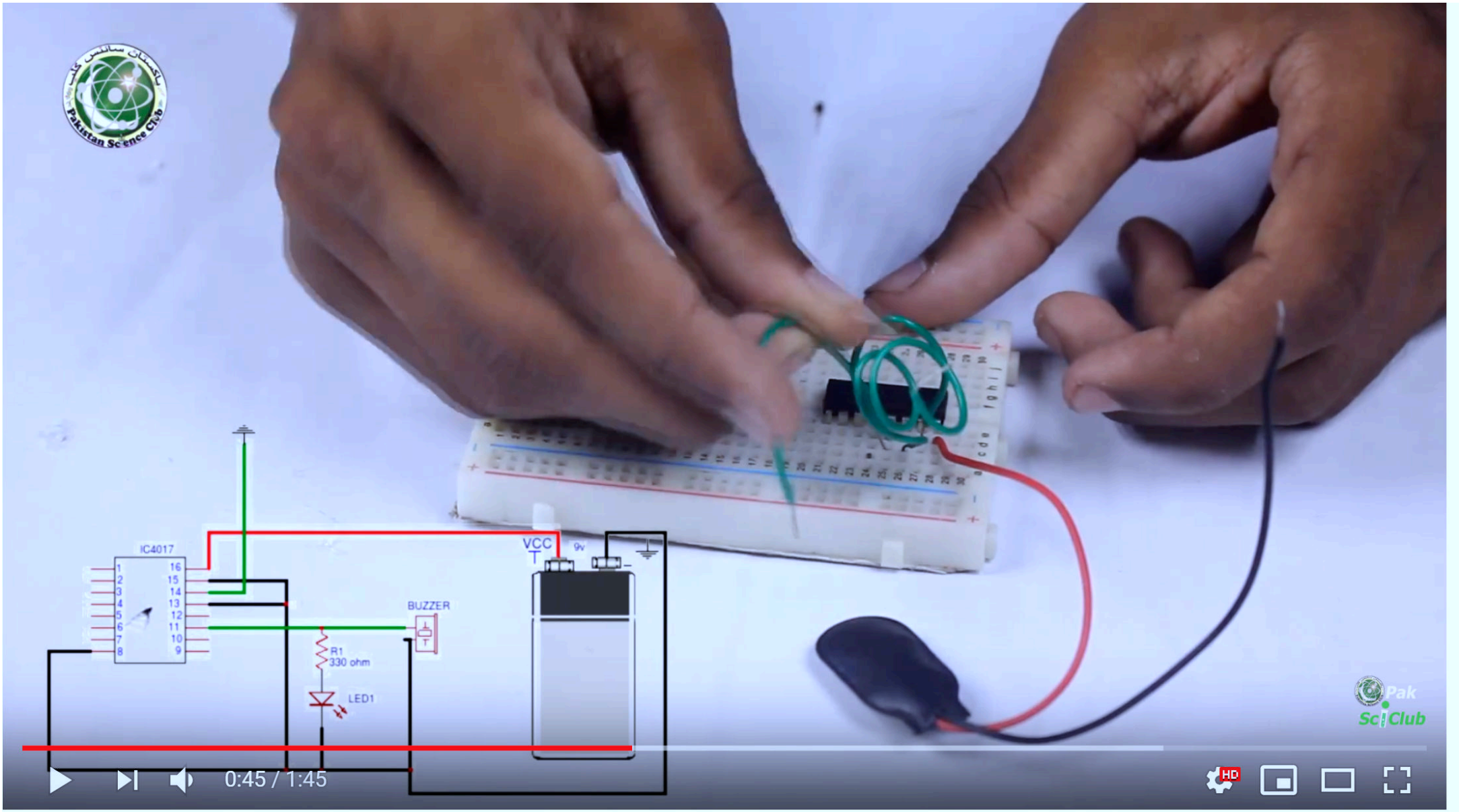

IC4017
1
2
3
4
5
6
7
8
16
15
14
13
12
11
10
9
VCC
9v
BUZZER
R1
330 ohm
LED1
Download this diagram from paksc.org
0:28 / 1:45

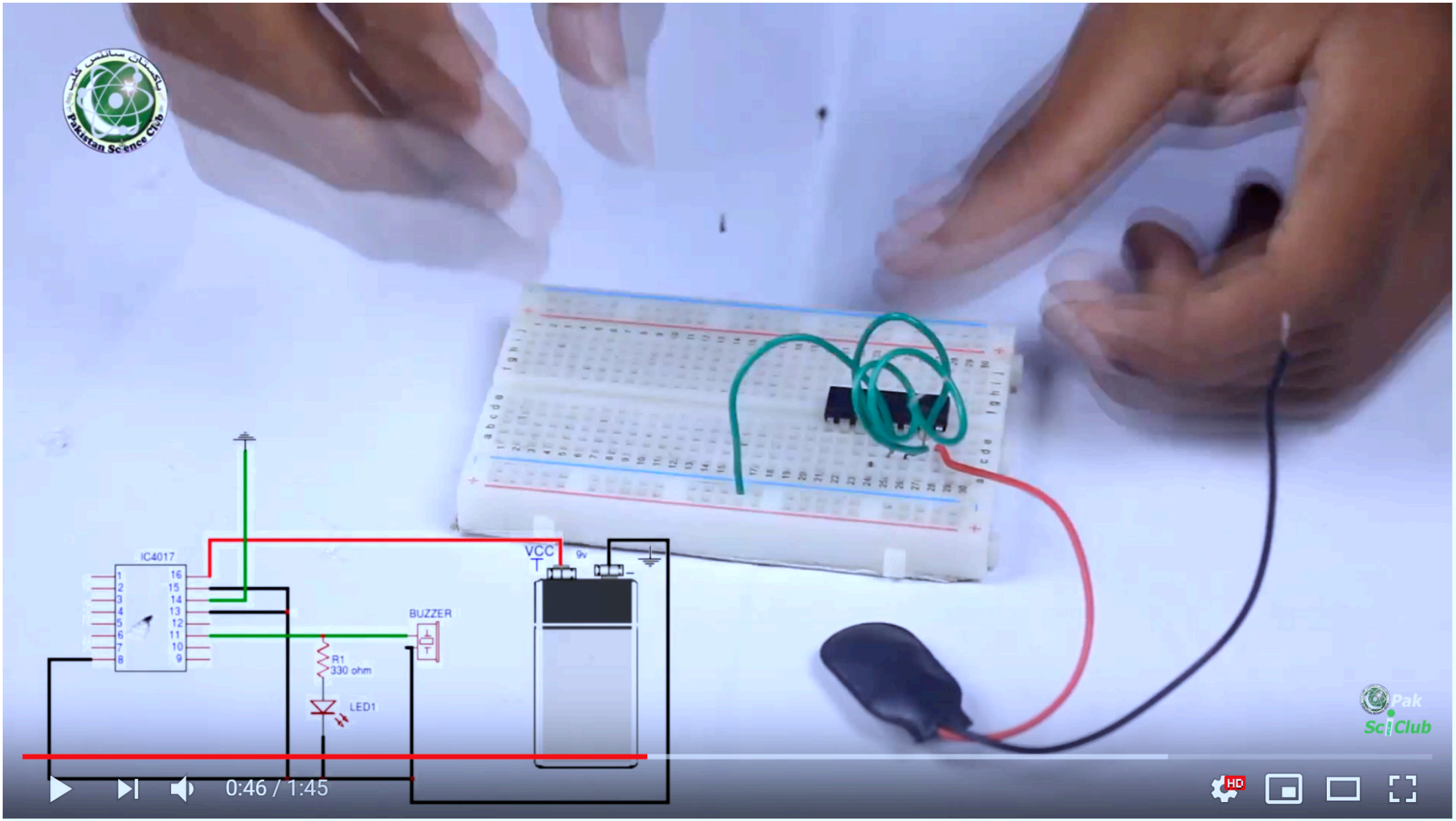

IC4017
VCC
9v
BUZZER
R1
330 ohm
LED1
0:33 / 1:45
Pak
Sc!Club


IC4017
VCC
9v
BUZZER
R1
330 ohm
LED1
0:37 / 1:45
Pak
SciClub


Pakistan Science Club
IC4017
VCC
9v
BUZZER
R1
330 ohm
LED1
0:40 / 1:45
Pak
SciClub


Pakistan Science Club
IC4017
BUZZER
R1
330 ohm
LED1
VCC
9v
0:43 / 1:45
Pak
SciClub


IC4017
1
2
3
4
5
6
7
8
16
15
14
13
12
11
10
9
BUZZER
R1
330 ohm
LED1
VCC
9v
0:45 / 1:45
Pak
Sci Club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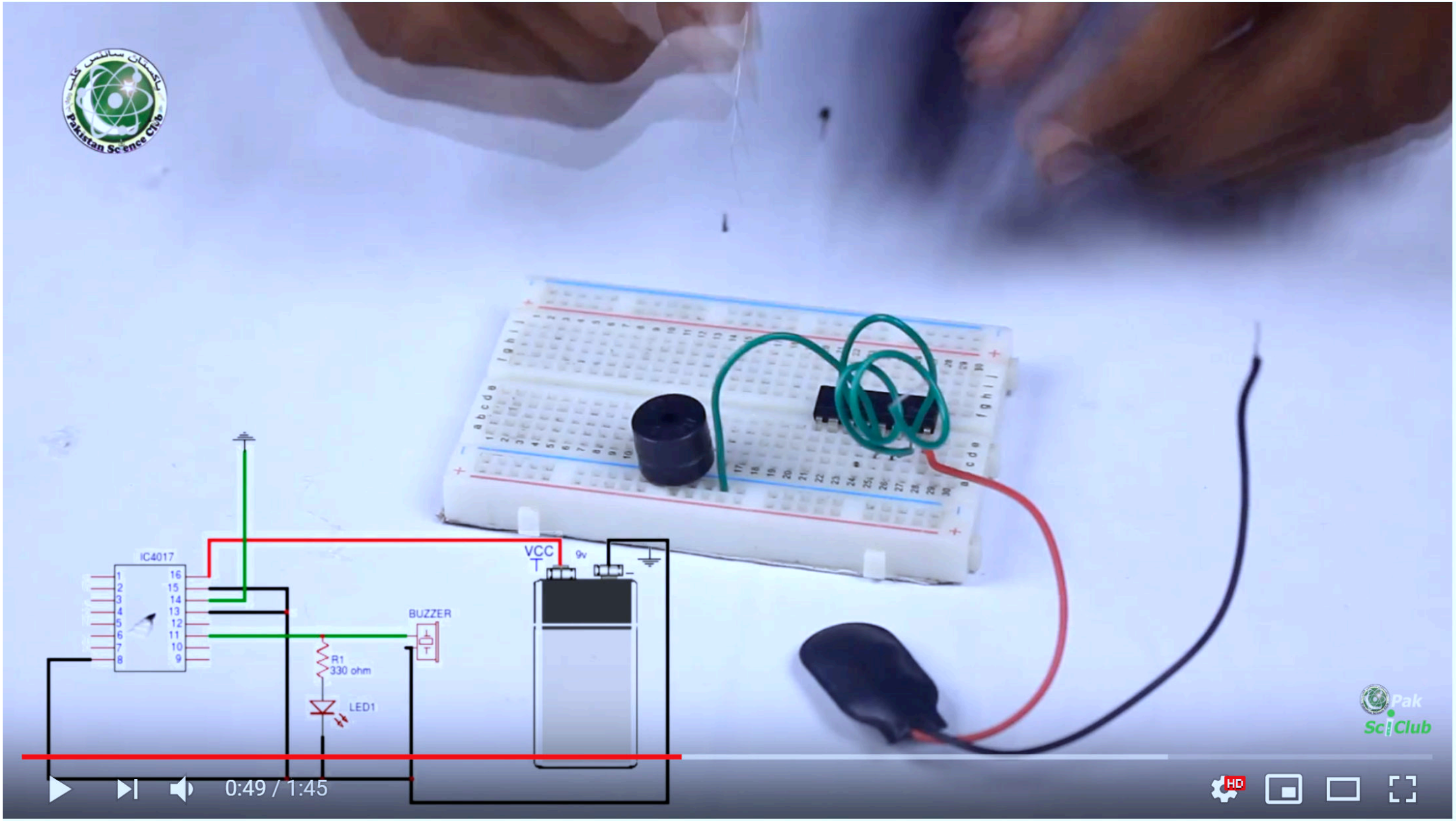
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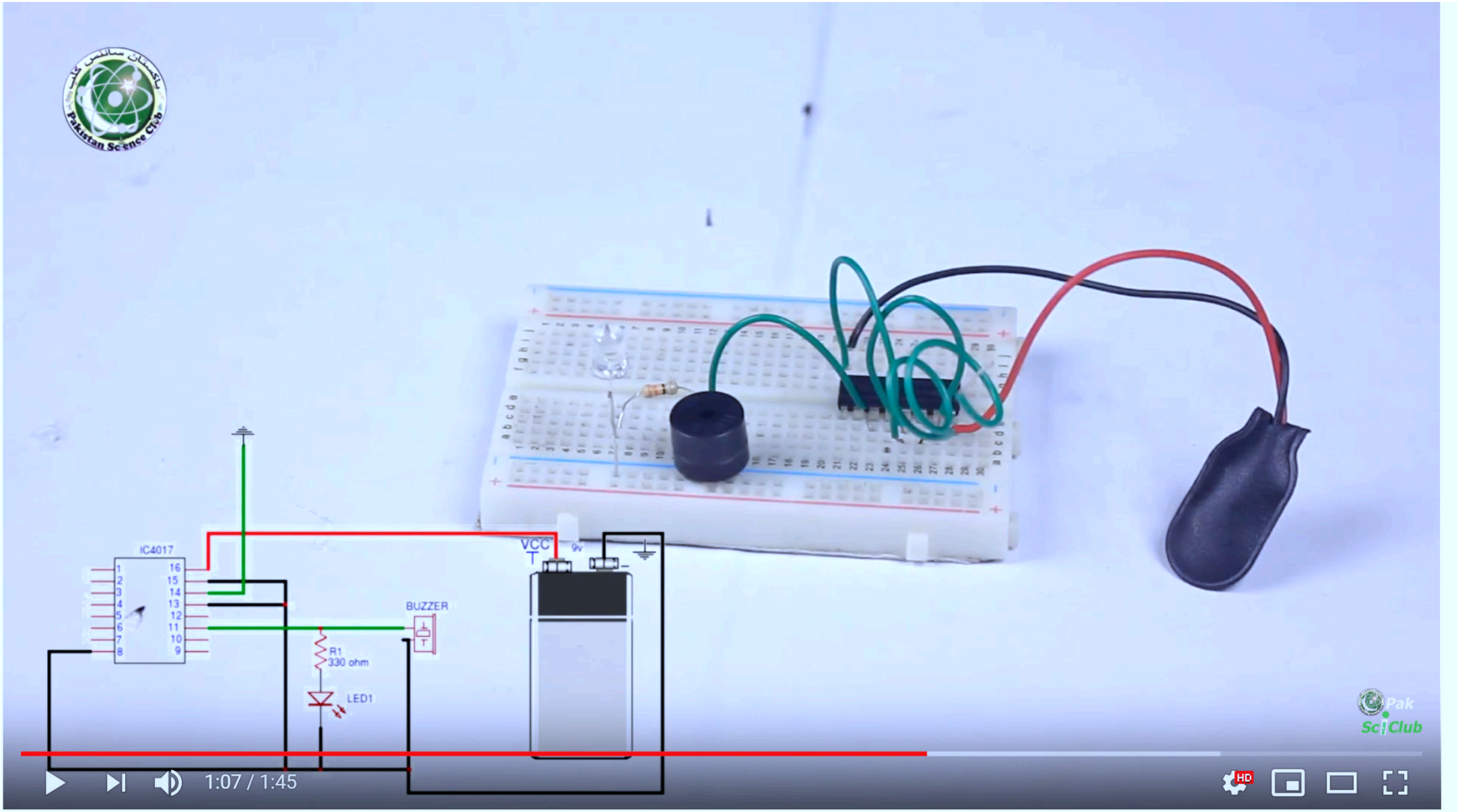
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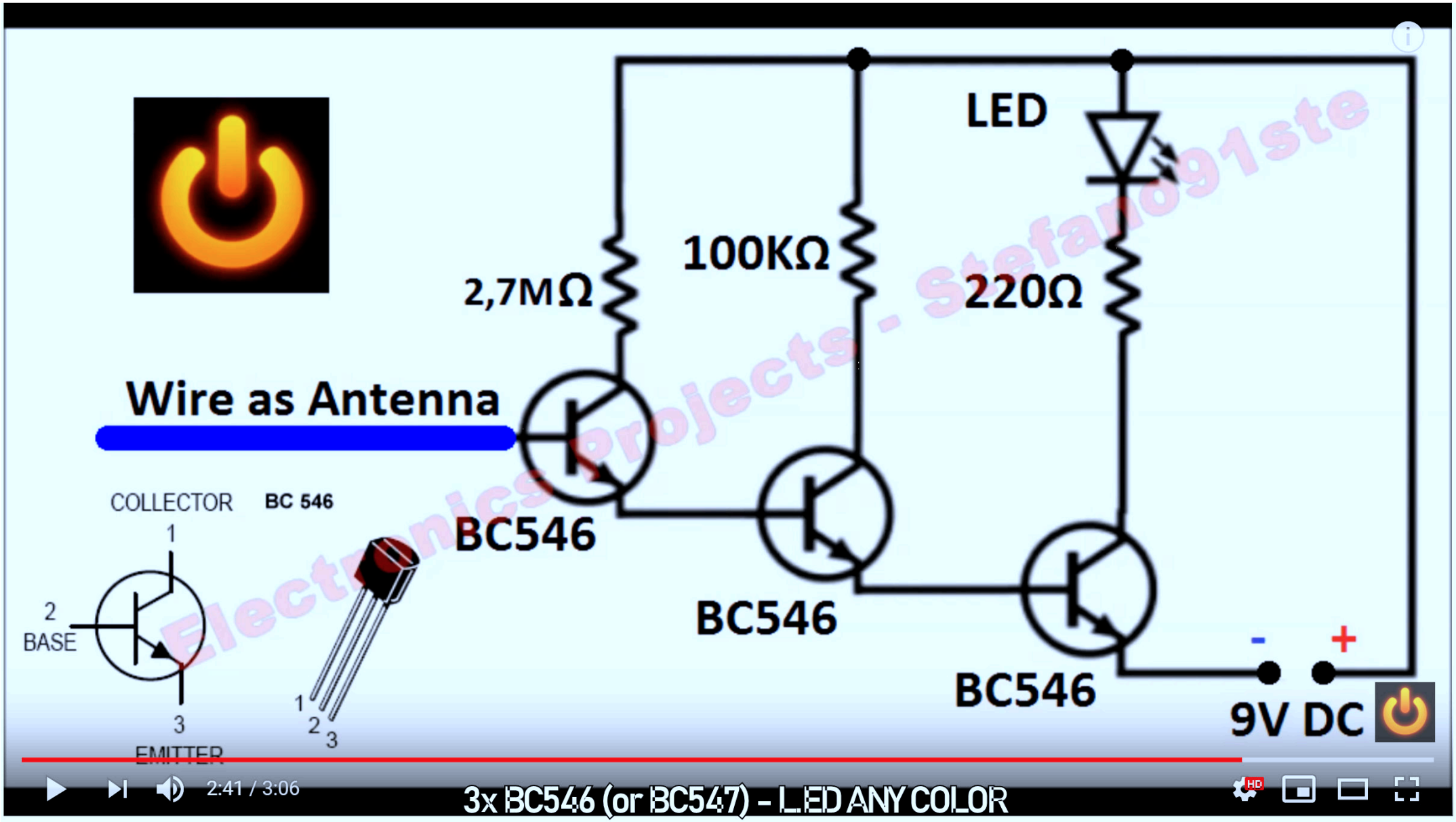
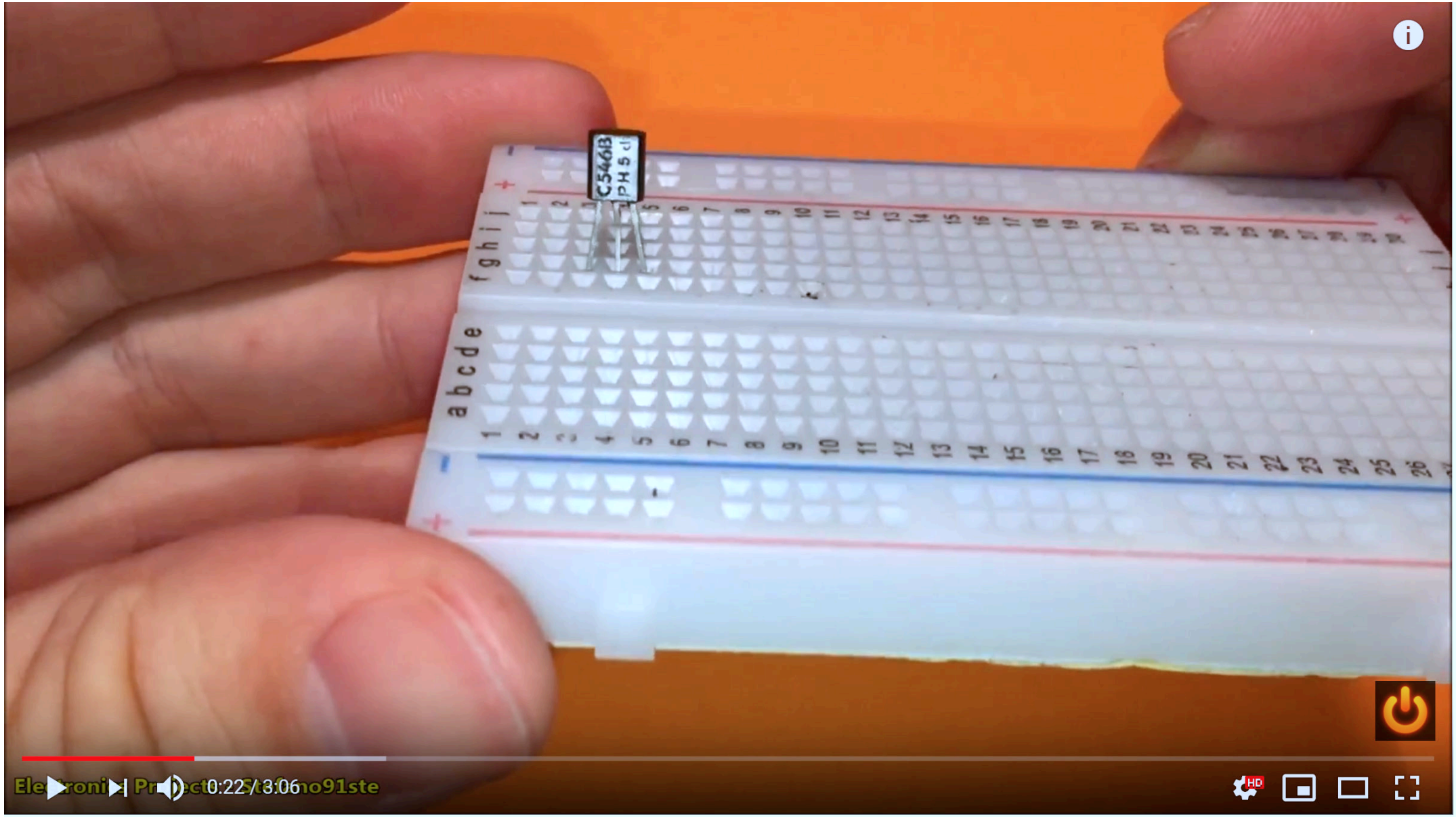


#ElectronicProjects #Electronic #Halloween2018

How to Make a Ghost Detector [Halloween 2018] - By STE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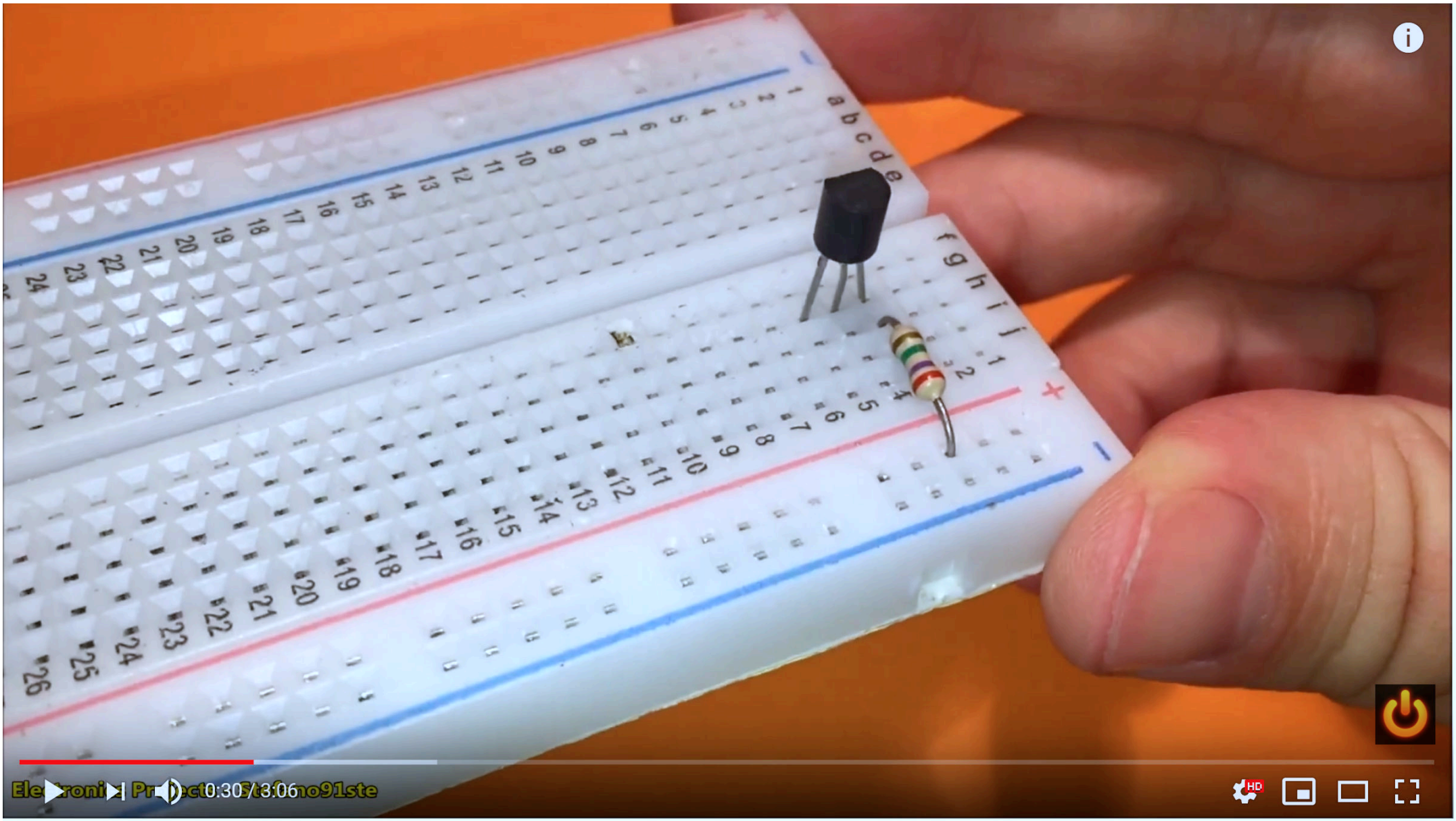
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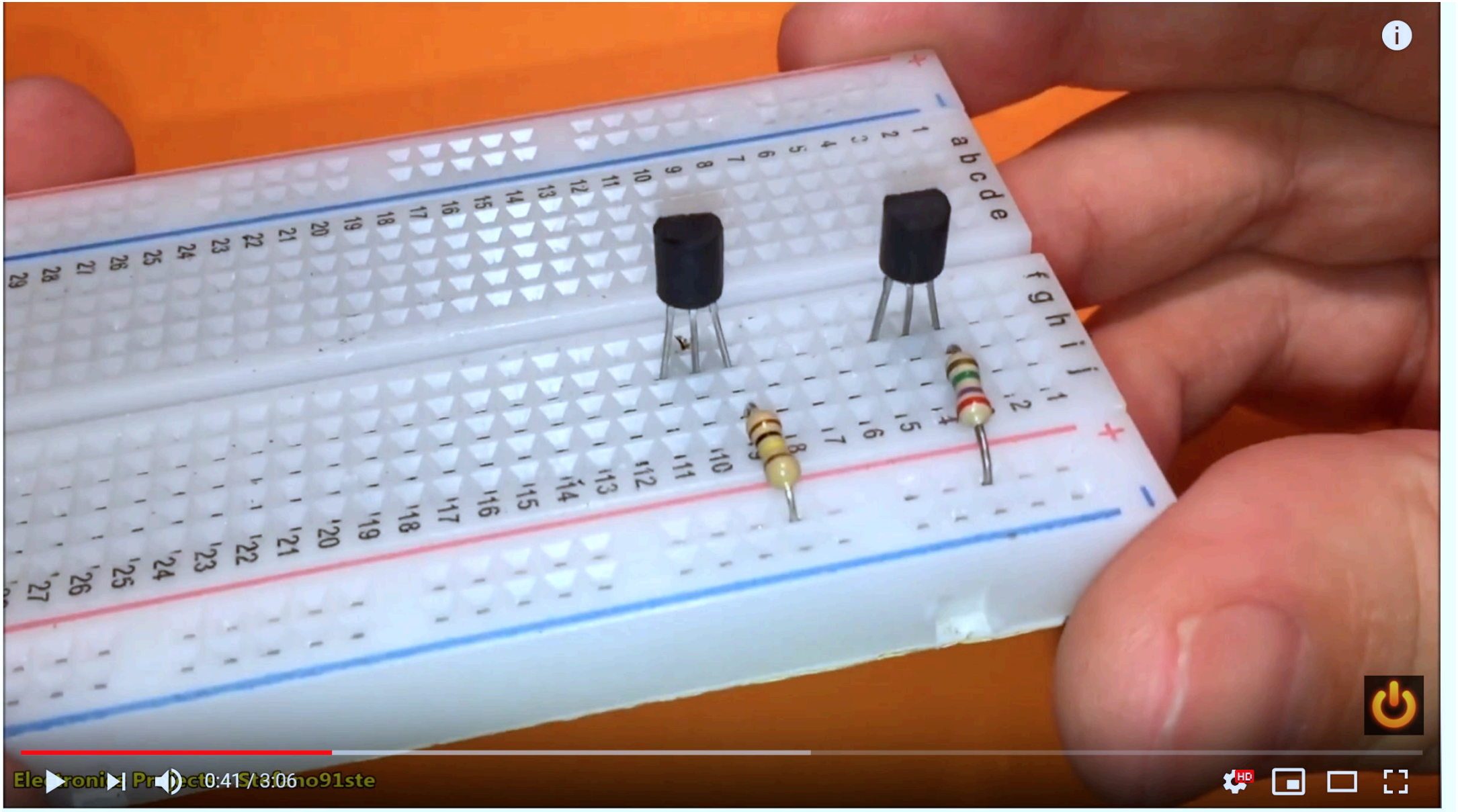
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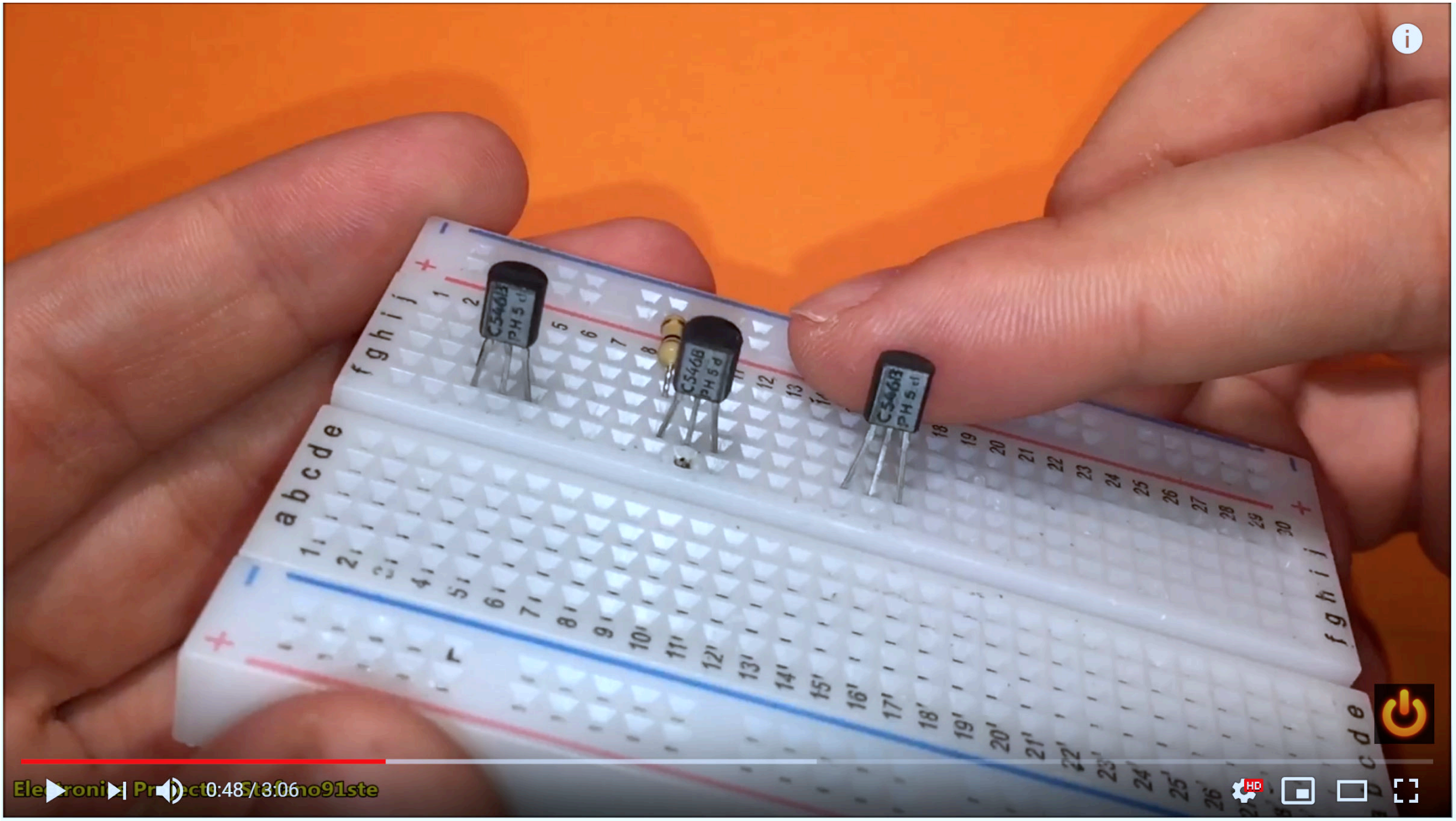
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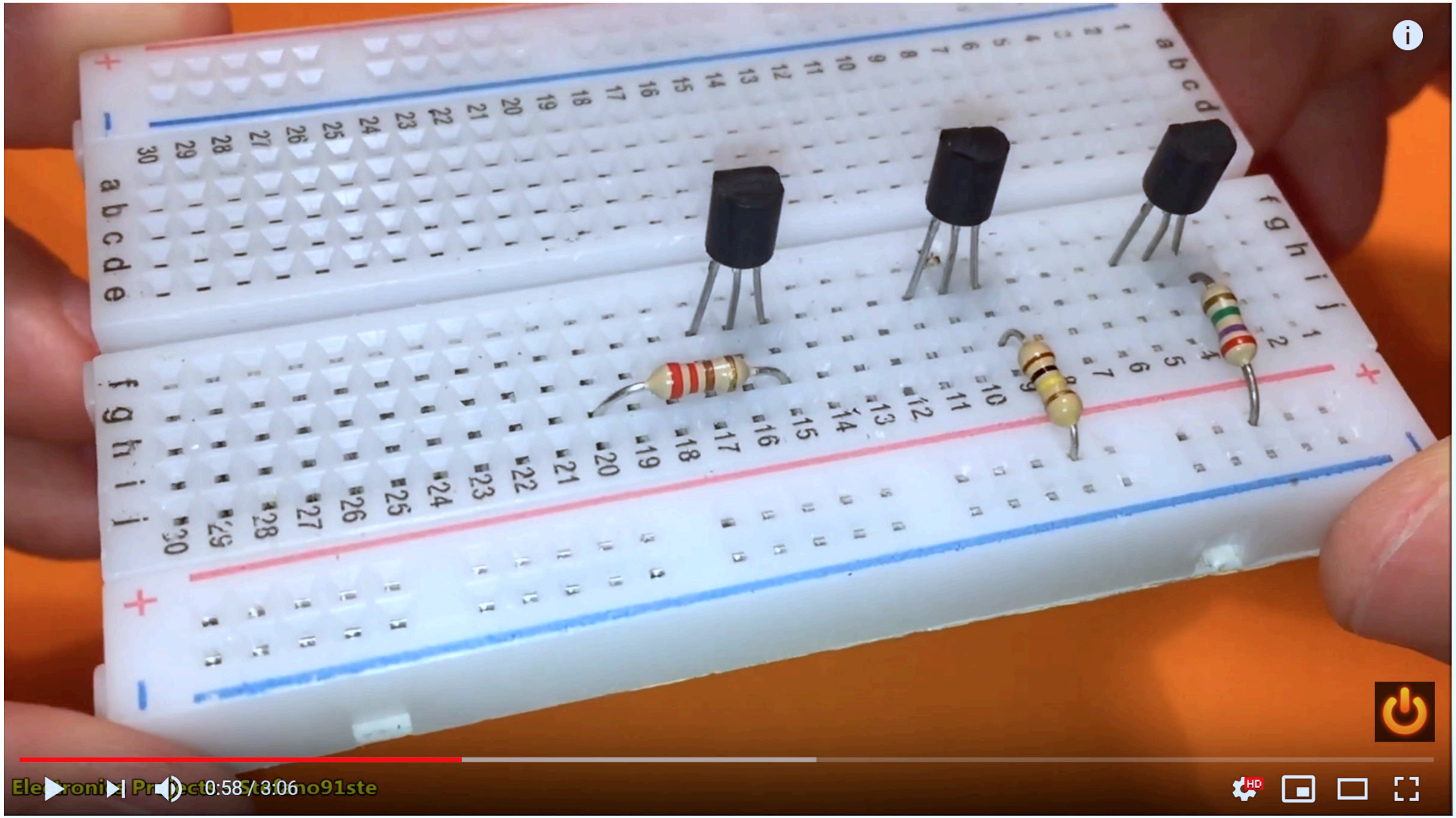
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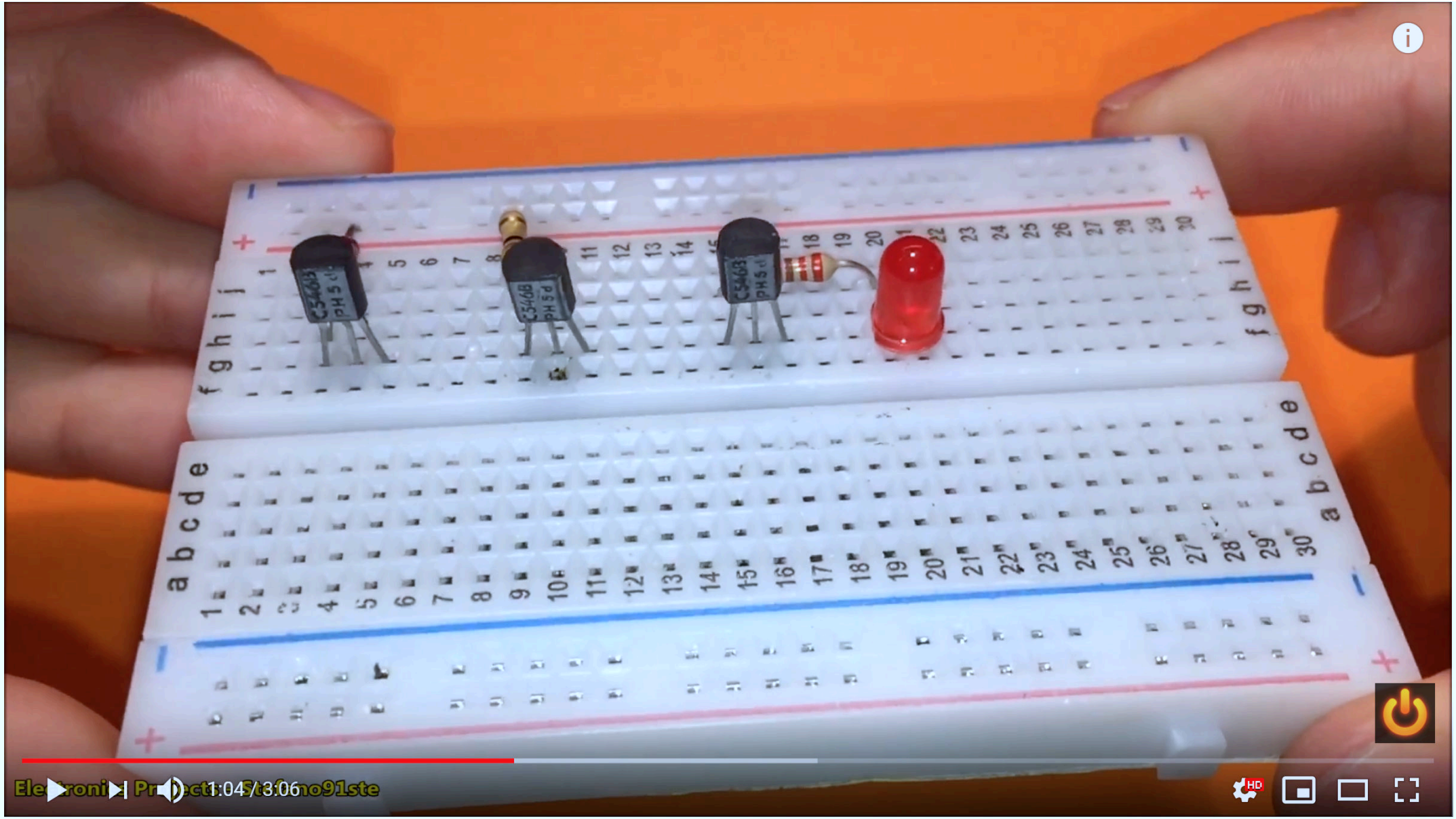
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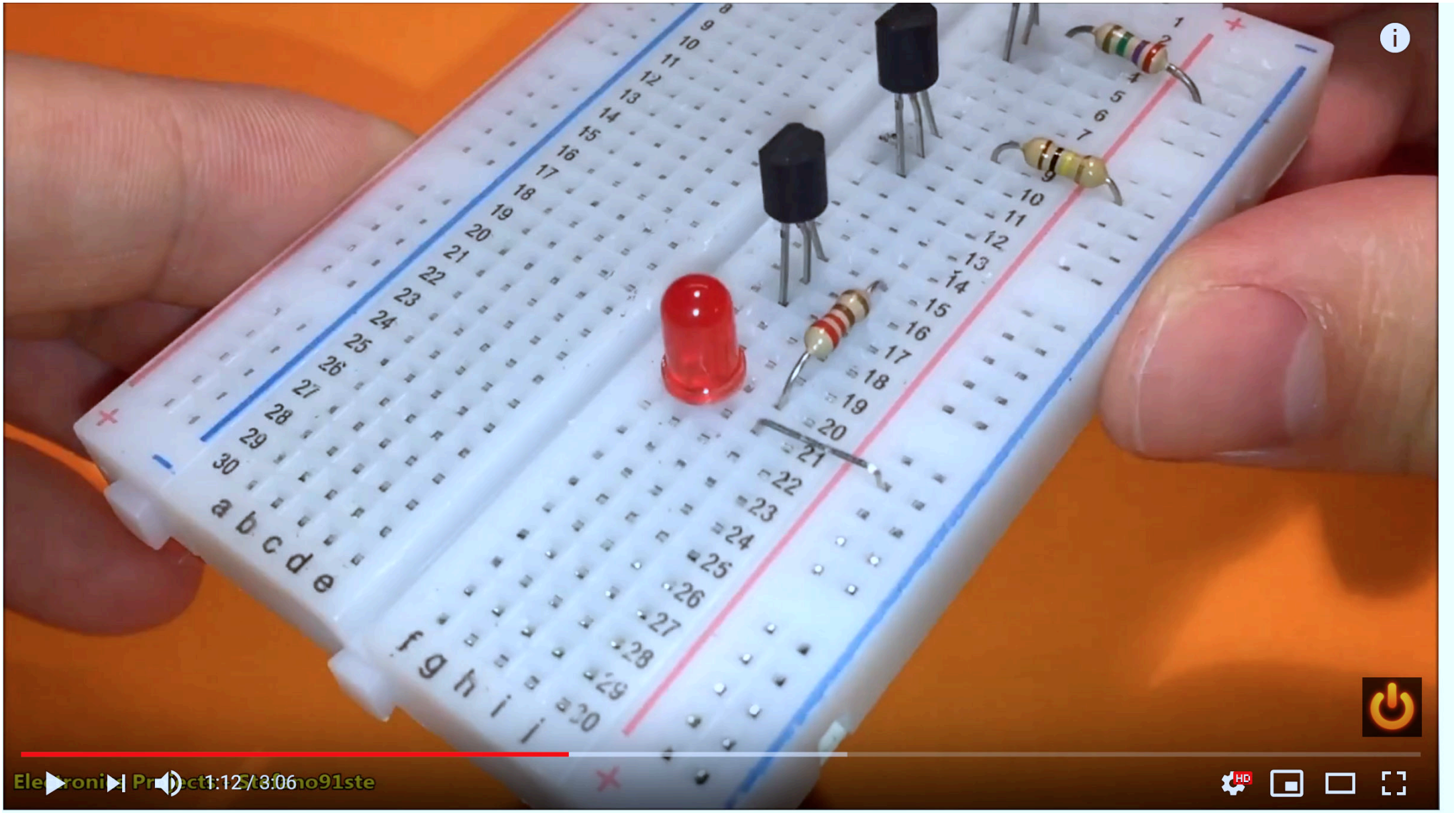
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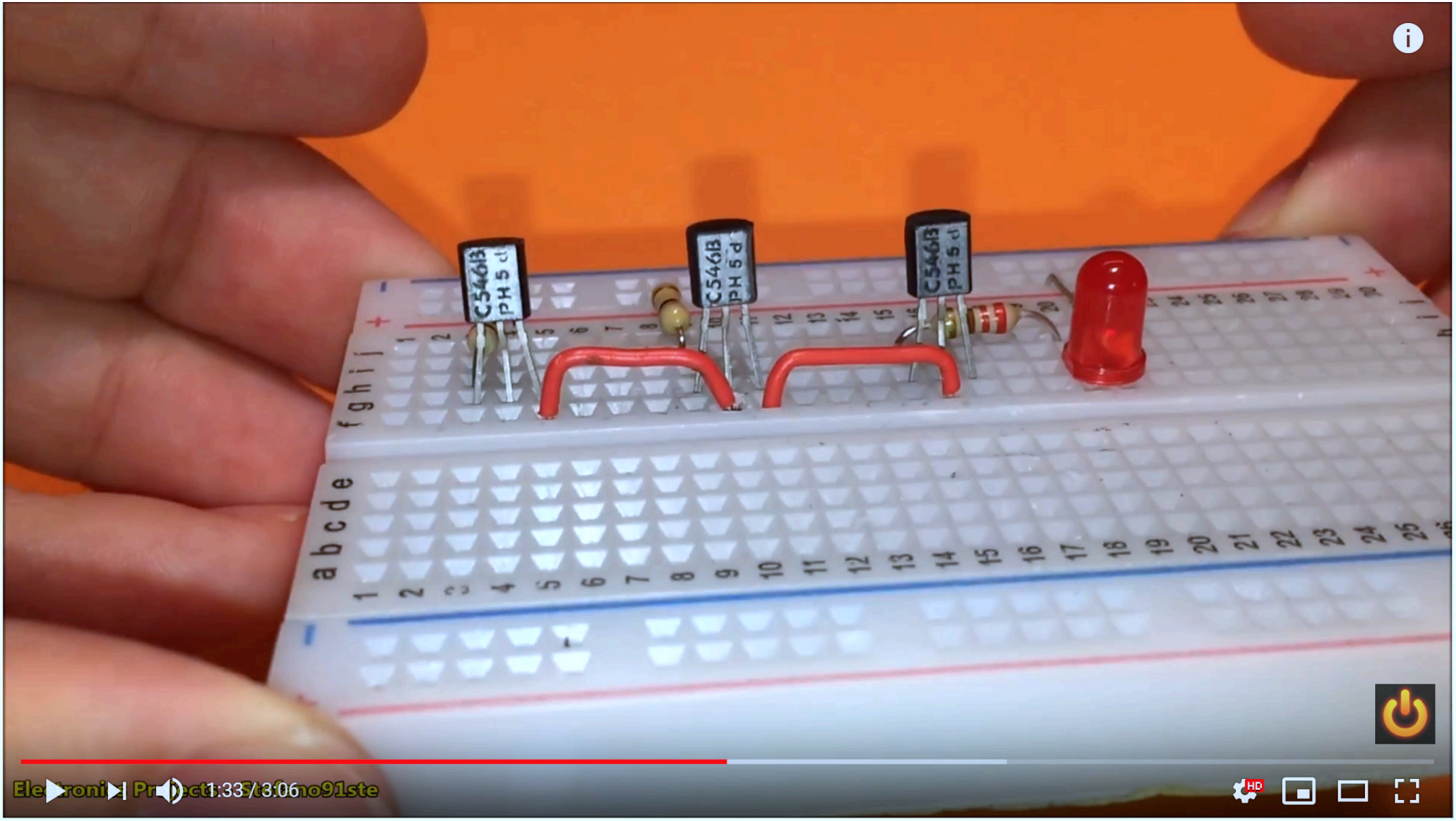
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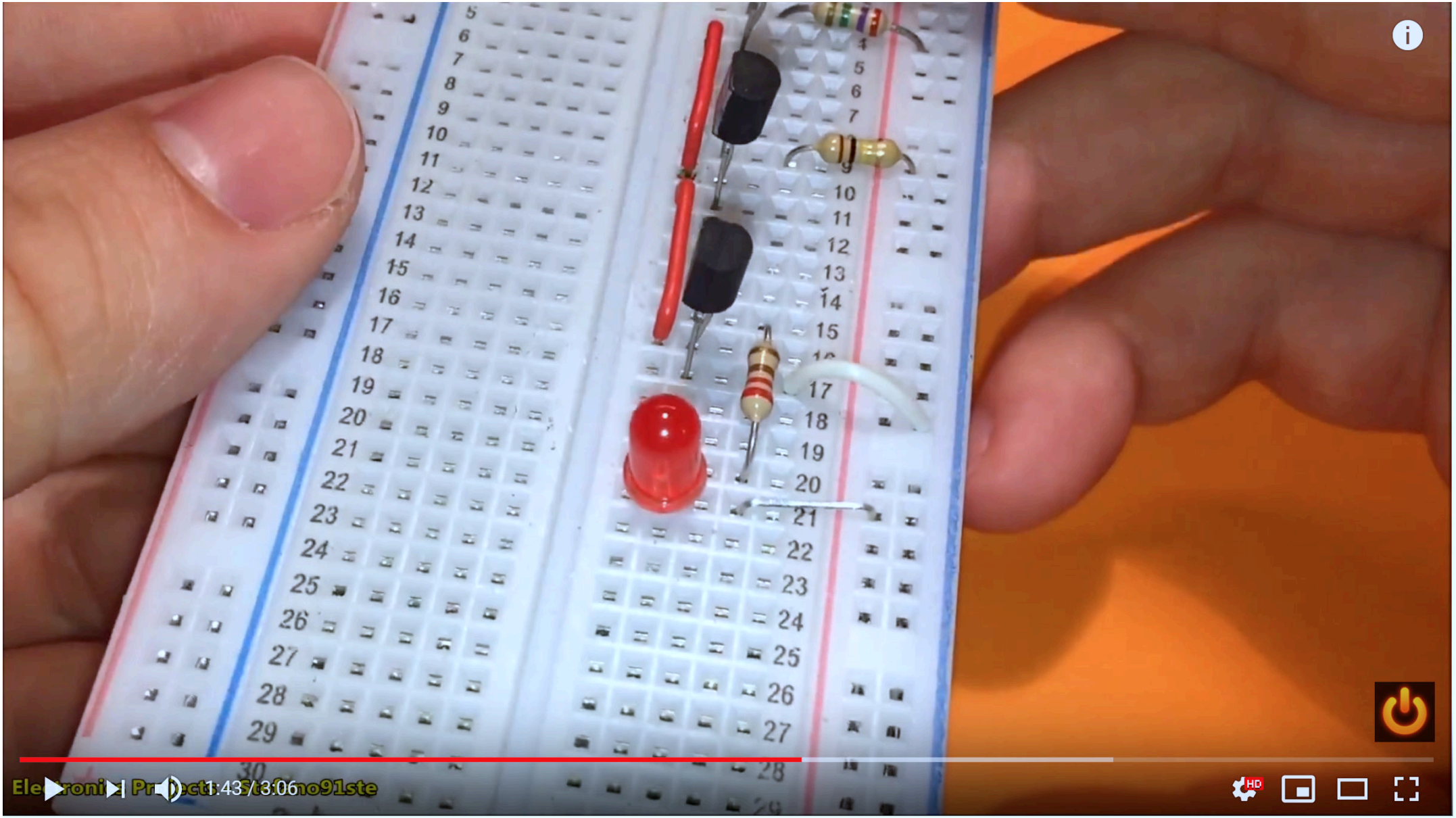
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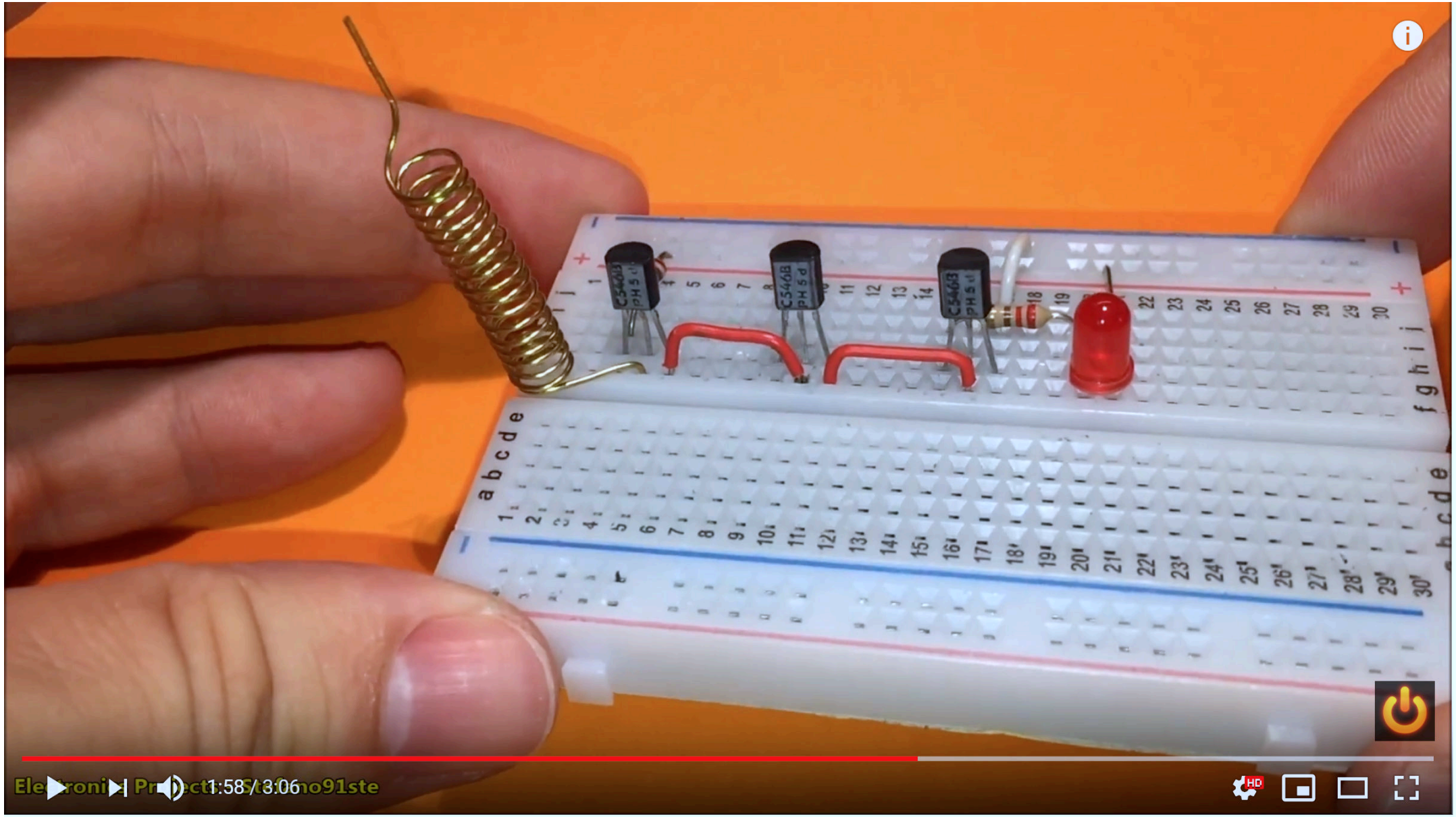
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EMF Meter
measure the strength of the magnetic field.
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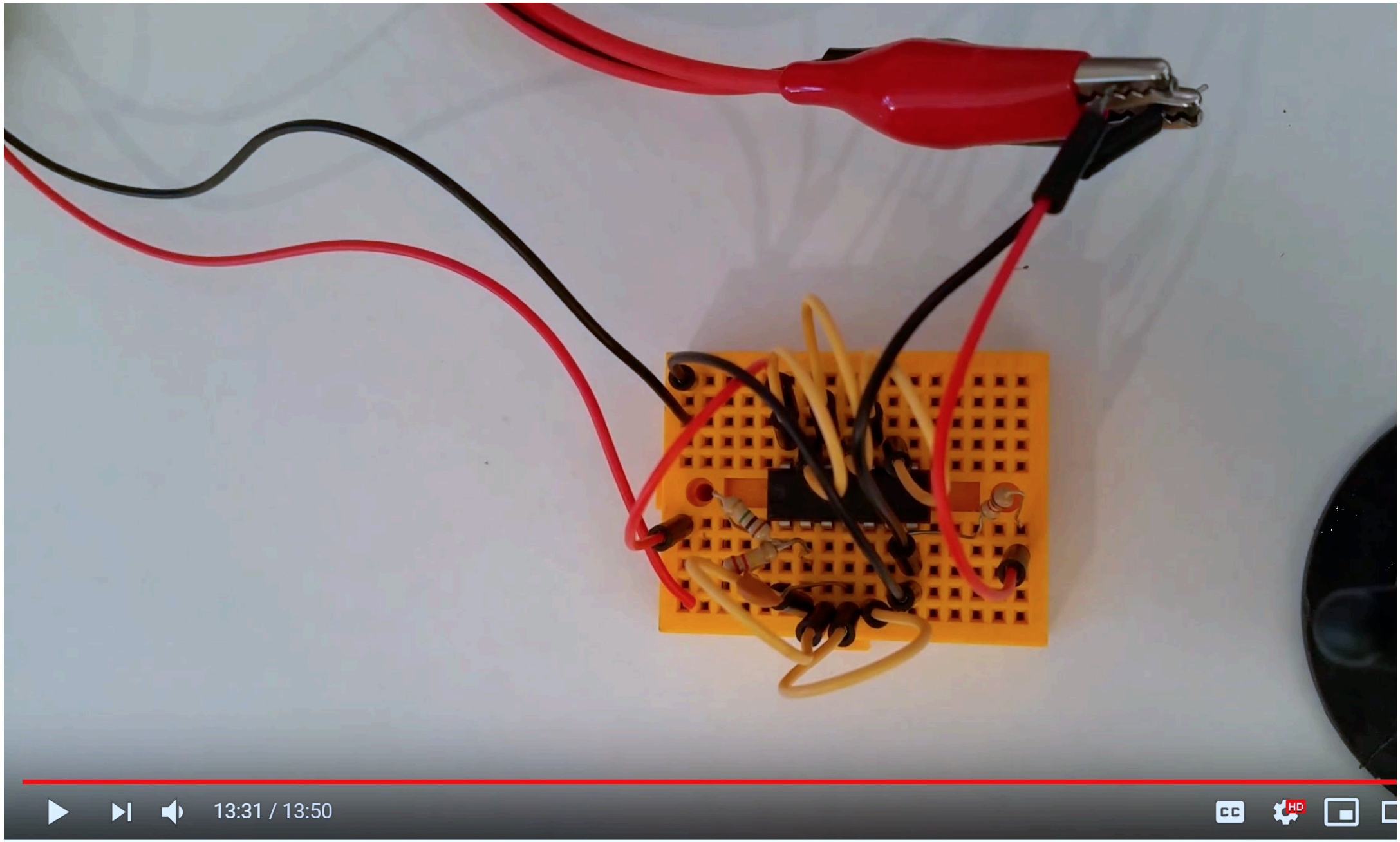


DIY: How to build your own Hulda Clark Zapper

Parts and Materials

- A CD4069 hex inverter (Digikey link)
- 1 1M resistor, 1 220k resistor, and 1 1k resistor 1M, 220k, 1k.
- 1 100pf capacitor (Digikey link)

The Zapper is a very low power device so 1/4 watt resistors and 25 volt capacitors will be plenty sufficient, but feel free to use whatever you find handy.

NOTE: The exact values of most components may be substituted according to what you have on hand. The 220k resistor and the 100pf capacitor determine the frequency of the Zapper, which may be allowed to vary pretty widely according to Dr. Clark. The 1M should be kept relatively large compared to the 220K to provide a reasonably symmetric waveform. The 1k should be kept within 10 or 20 percent of value to provide reasonable current limiting. (If you know what you are doing and want to try different output currents, you can adjust this accordingly.)
(Click here for more information on varying the frequency)

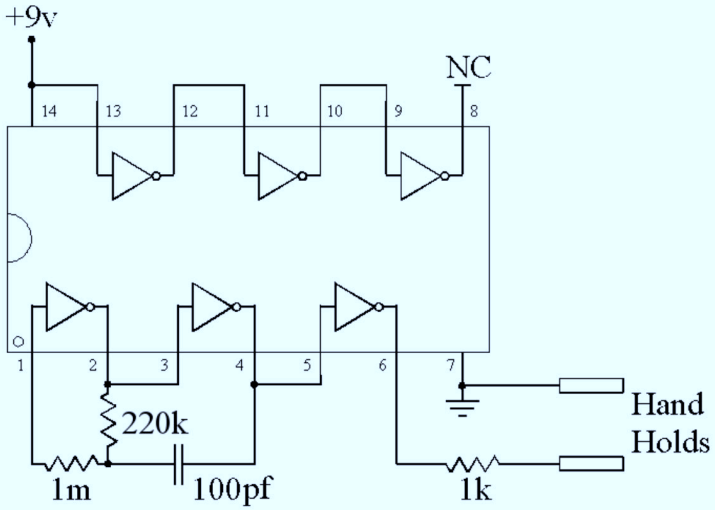
The following parts may be substituted according to your preference, though something of the kind will be needed:
- Solderless breadboard (Amazon link)
- 9-volt battery
- 4 alligator clip-lead sets Radio Shack link
- 2 pieces of copper pipe (hand-holds)

* Sorry, Radio Shack appears to have changed their linking structure and their links don't seem to be working correctly. If you search around their site a bit you should be able to locate the necessary components. I'll try to post some alternate links when I get a chance.

Instructions

Plug the components into the solderless breadboard according to the schematic. Make sure none of the wires touch each other. Connect pin 14 of the chip to the positive terminal on the battery and pin 7 to the negative terminal, using clip leads or other suitable connectors. The two hand-holds are attached with another two clip leads. (One goes to ground on pin 7, the other to the loose end of the 1k resistor.)

Schematic Click Here to see Schematic in separate window



The above instructions are clearly not the only way you can do it. You can, for example, solder all the components directly onto a 14-pin socket or onto a piece of electronic perf board, like we do in our ready made version. This is a lot more time-consuming and difficult for most people, which is why we recommend a breadboard. As mentioned above, the resistors and capacitor don't all have to be the exact values mentioned here to make a working Zapper. However, any variation in capacitance or resistance will affect the output frequency. (There are limits on frequency and power consumption that the chip can handle, so don't stray too far from the specified values.)

If you have access to an oscilloscope you can use it to check your Zapper output when you are finished.

Click here to tell your friends how to build a zapper!

Hulda Clark Zapper

DIY Geiger Counter - Page 1

DIY Build Your Own Geiger Counter - radiation detector

This article shows you how to build a fully functional Geiger Counter capable of measuring the three primary forms of radiation*; alpha, beta and gamma radiation. The geiger counter is sensitive enough to detect background radiation. It's expandable. You can enhance the basic Geiger Counter by adding a Digital Meter Adapter (DMAD) that adds a digital output for the Counts Per Second (CPS). The DMAD when used with a USB TTL adaptor can use our free Windows Radiation monitoring program . The DMAD also has a true Random Number Generator function. The windows XP radiation program is free and available for downloading here.

The Geiger Counter produces an audible click and blinks a LED each time it detects a radioactive particle. It has a Data output jack, that outputs a +5V pulse everythime a radioactive particle is detected. It also has a headphone jack for private listening. Typically the Geiger counter clicks 10-20 times a minute due to normal background radiation. While the device is sensitive enough to measure background radiation, it is not suitable for measuring radon gas. There are Radon gas detectors that use an activated charcoal filter that are easy to use and more accurate.

***Using GMT-01 (LND-712).**
When using GMT-02, Geiger counter can only detect beta, x-ray and gamma

Radioactivity

Radioactivity is the spontaneous emission of energy from the nucleus of certain atoms. The most familiar radioactive material is uranium.

There are three forms of energy associated with radioactivity; alpha, beta and gamma radiation. The classifications were originally determined according to the penetrating power of the radiation, see **Figure 1.** Our Geiger Counter can detect the three types of radiation; alpha, beta and gamma radiation.

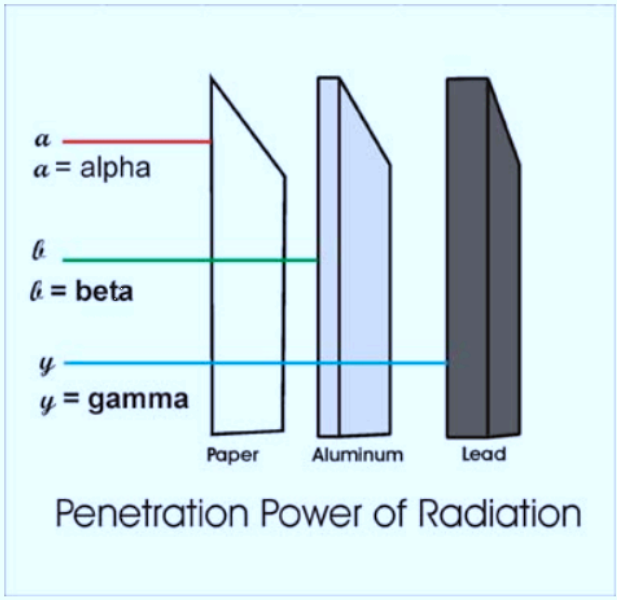


Figure 1. Penetration strength of radiation

Alpha radiation are the nuclei of helium atoms, two protons and two neutrons bound together. Alpha rays have a net positive charge. Alpha particles have weak penetrating ability, a couple of inches of air or a few sheets of paper can effectively block them.

Beta radiation were found to be electrons, identical to the electrons found in atoms. Beta rays have a net negative charge. Beta rays have a greater penetrating power than Alpha rays and can penetrate 3mm of aluminum.

Gamma radiation are high-energy photons. This has the greatest penetrating power being able to pass through several centimeters of lead and still be detected on the other side. Thick lead is needed to attenuate gamma radiation.

Next Page >

Geiger Mueller tubes are simple devices that detect and measure radioactivity. The original design by H. Geiger and E.W. Mueller in 1928 hasn't change very much. The basic sensor functioning remain the same.

A cut away drawing of a typical Geiger Mueller (GM) tube is shown in Figure 2. The wall of the GM tube is a thin metal (cathode) cylinder surrounding a center electrode (anode). The metal wall of the GM tube serves as the cathode of the GM Tube. The front of the tube is a thin Mica window sealed to the metal cylinder. The thin mica window allows the passage and detection of the weak penetrating alpha particles. The GM tube is first evacuated then filled with Neon, Argon plus Halogen gas.

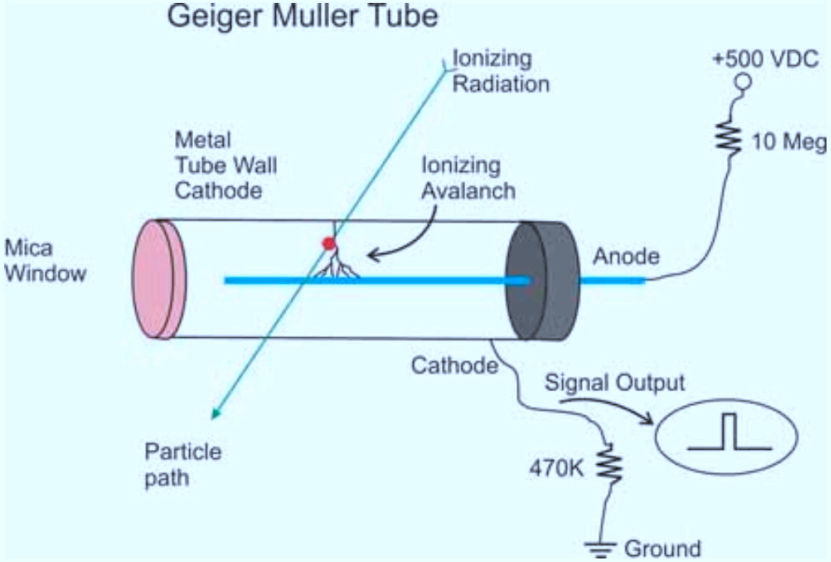


Figure 2. Cross-section and function of typical Geiger Mueller tube

Our GM tube is put into an initial state (ready to detect a radioactive particle), by applying + 500-volt potential to the anode (center electrode) through a ten mega ohm current limiting resistor. A 470K-ohm resistor is connected to the metal wall cathode of the tube and to ground. The top of the 470K resistor is where we see our pulse signal whenever a radioactive particle is detected.

In this initial state the GM tube has a very high resistance. However, when a radioactive particle passes through the GM tube, it ionizes the gas molecules in its path and creates a momentary conductive path in the gas. This is analogous to the vapor trail left in a cloud chamber by a particle. In the GM tube, the electron liberated from the atom by the particle, and the positive ionized atom both move rapidly towards the high potential electrodes of the GM tube. In doing so they collide with and ionize other gas atoms, creating a momentary avalanche of ionized gas molecules. And these ionized molecules create a small conduction path allowing a momentary pulse of electric current to pass through the tube allowing us to detect the particle.

This momentary pulse of current appears as a small voltage pulse across the 470 K ohm resistor. The halogen gas quickly quenches the ionization and the GM tube returns to its high resistance state ready to detect more radioactivity.

DIY Geiger Counter - Page 3

Radiation Measurement - GM Tube's Dead Time

For the short amount of time the GM tube is detecting one particle, if another radioactive particle enters the tube it will not be detected. This is called dead time. The maximum dead time for our GM tube is 90 microseconds (or .00009 seconds). There is a mathematical formula for adjusting a Geiger counter read out to compensate for the GM tube's dead time. However the adjust is so small that for practical applications it can be ignored. High-end nuclear work will take a tube's dead time into consideration.

Count Rate vs. Dose Rate

Each output pulse from the GM tube is a count. The counts per second give an approximation of the strength of the radiation field. The GM tube has been calibrated using a cesium-137. The chart is shown in **Figure 3.**

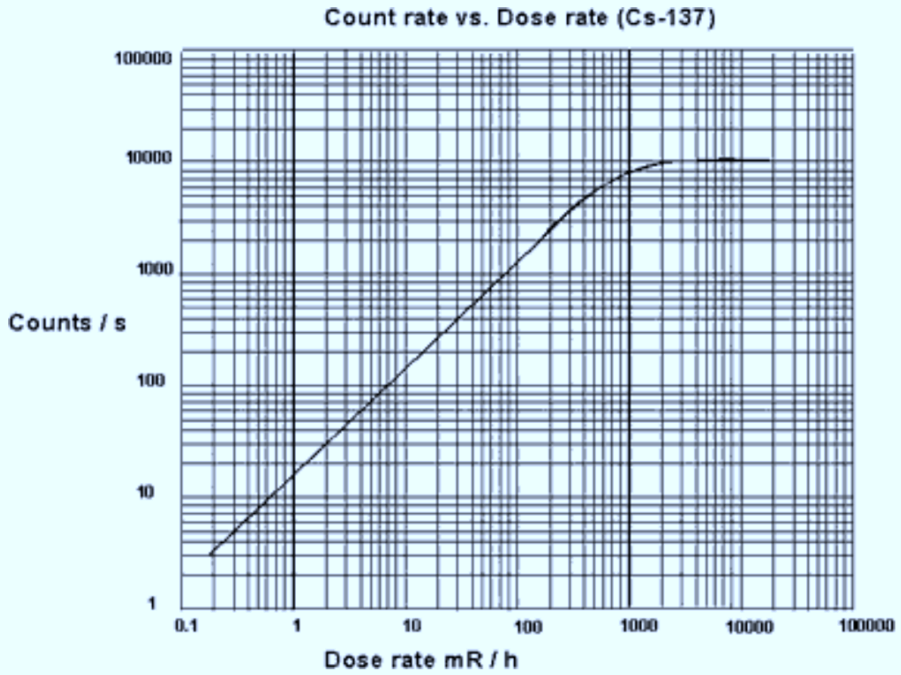


Figure 3. Chart detailing Count Rate vs. Dose Rate

Geiger Counter Schematic

The circuit is shown in Figure 4. The 4049 Hex Inverting Buffer is set up as a square wave generator. The power MOSFET IRF830 switches the current on and off to the primary windings of the mini step-up transformer. The output of the mini step-up transformer is fed to a voltage doubler consisting of two high voltage diodes D4 and D5 and two high voltage capacitors C3 and C4.

The high voltage output from this stage is regulated to 500 volts needed for our GM tube, *GMT-01 (LND 712) by three zener diodes stacked one on top of the other (D6, D7 and D8). Diodes D7 and D8 are 200V zener diodes and diode D6 is a 100-Volt zener. Together (200 + 200 + 100 = 500), they equal 500 volts. Five hundred volts is the optimum operating voltage for our GM Tube.

The 500-volt regulated output is fed to the anode of the LND 712 GM tube through a current limiting 10 mega-ohm resistor R16. The 10 mega-ohm resistor limits the current through the GM tube and helps quench the avalanched ionization when a radioactive particle is detected.

*To regulate to the 400 volts needed for the GMT-02 Tube, a jumper is placed on P10. THis jumps the 100-volt zener diode at D6. R16 becomes a 2.2 mega-ohm resistor when using the GMT-02.

The cathode of the tube is connected to a 5.1V (D2) Zener diode. The voltage pulse across D2 generated by the detection of radiation, feeds to the base of a 2N3904 NPN transistor.

The NPN transistor clamps the output pulse from the GM tube to Vcc and feeds it to a comparator gate on the LM339. The pulse signal from the gate, pin 14 of the LM339, is a trigger to the 555 Timer through Q4. The timer is set up in monostable mode that stretches out the pulse received on its trigger. The output pulse from the timer flashes the LED and outputs an audible click to the speaker via pin 3.

Figure 1 CDV-715 Retro Digial Geiger Counter

The CDV-715 has a perfect Cold War style case to house a modern sensitive digital Geiger counter, see figure 1. The Analog Digital meter displays Counts Per Second (CPS), Approximate Radiation Level in either imperial measurements (mR/hr) or metric measurements (mSv/hr). The top line of the display alternates every second between the approximate radiation level and the Counts Per Second (CPS). The 2nd LCD line is a power meter that provides a quick visual indication of the current CPS reading, more on this later, see figure 2.

CDV-715 Retro Digital Geiger Counter : Page 2

Figure 2 Analog-Digital Meter

In the 1960's, at the height of the Cold War over half a million Civil Defense CDV-715 ion chamber radiological instruments were manufactured, see figure 3. In its day the CDV-715 could be found in government fallout shelters across the country. Unfortunately, this survey instrument only detects high levels of gamma radiation that would be encountered in a post nuclear attack or incident. So even good working CDV-715 models are not sensitive for most radioactive detection work.

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CDV-715 Retro Digital Geiger Counter : Page 3

Figure 3 CDV-715 Ion Chamber Radiological Instrument

When FEMA decommissioned the CDV-715, the instruments made their way onto the surplus market. Since so many instruments were manufactured, and because of their lack of sensitivity the CDV-715 can be found on Ebay for low cost. If you would like to retrofit a sensitive Geiger Counter inside a Cold War style case, read on. First step purchase a surplus CDV-715 from Ebay or elsewhere. It doesn't matter if the CDV-715 is in working order or not. We will be gutting all the old electronics out. It doesn't require to have a meter either since that will be replaced with a new faceplate that holds the new Analog Digital Meter. In Make magazine 29, I wrote a construction article for a Geiger counter circuit that easily fits this application. While I will not repeat the construction details for the Geiger counter circuit, I will point out the retro-fitting details. I like this circuit because it lends itself to a number of GM tubes available on the market, see figure 4.

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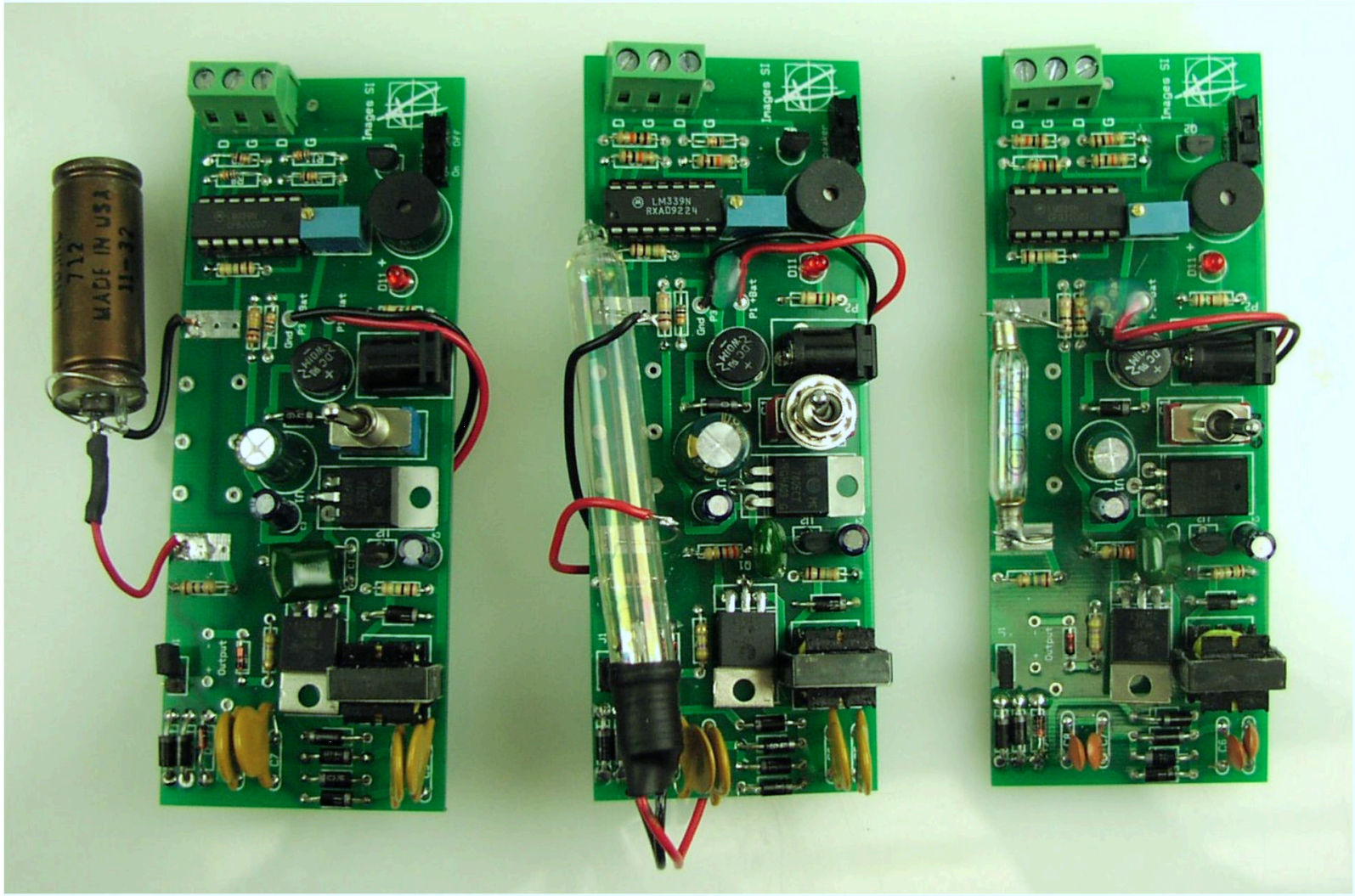
CDV-715 Retro Digital Geiger Counter : Page 4

Figure 4 CGK-02 Geiger Counter Circuit Board with three different GM Tubes



So by using this Geiger counter circuit you can power any GM tube that requires either 400 or 500 VDC. The board is the same as the pc board in the original article with the addition of a mounting holes drilled into the pc board colored in red, see figure 5

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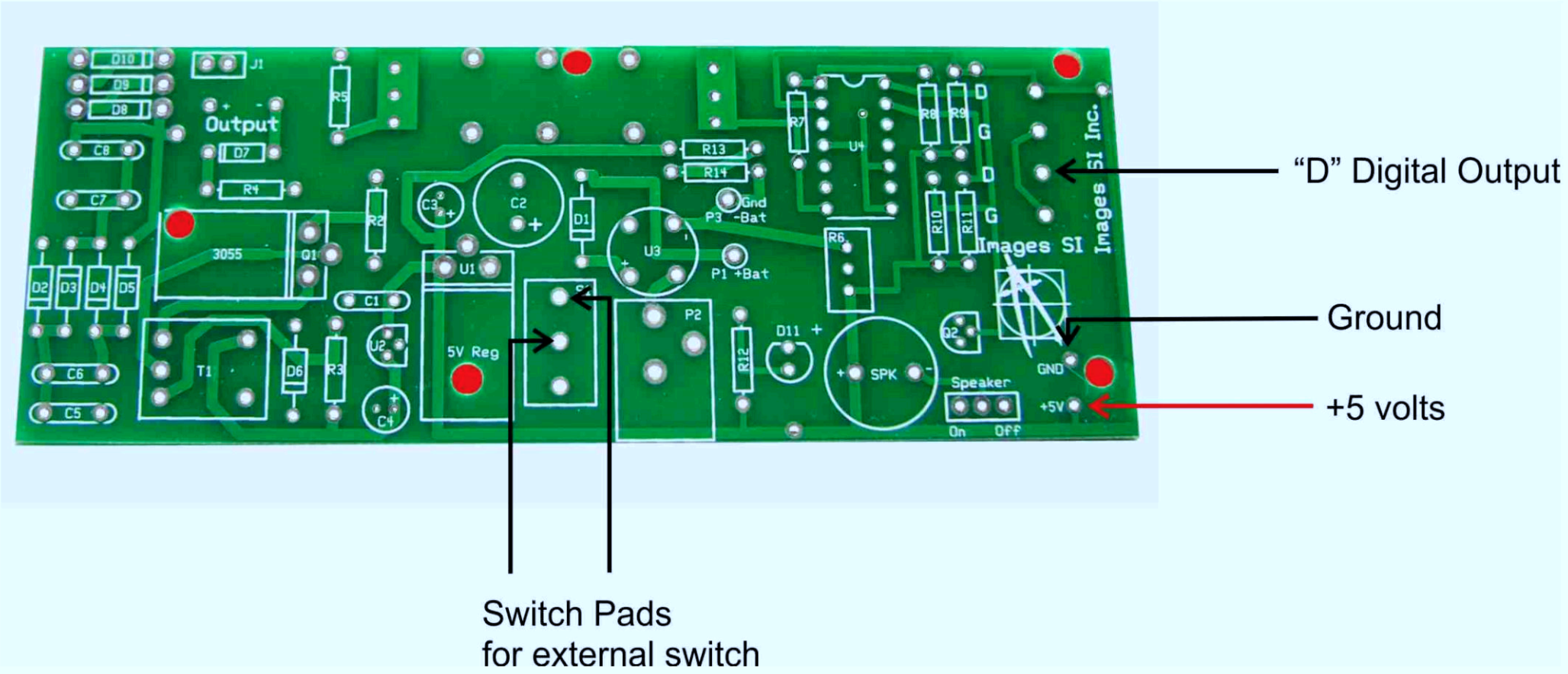
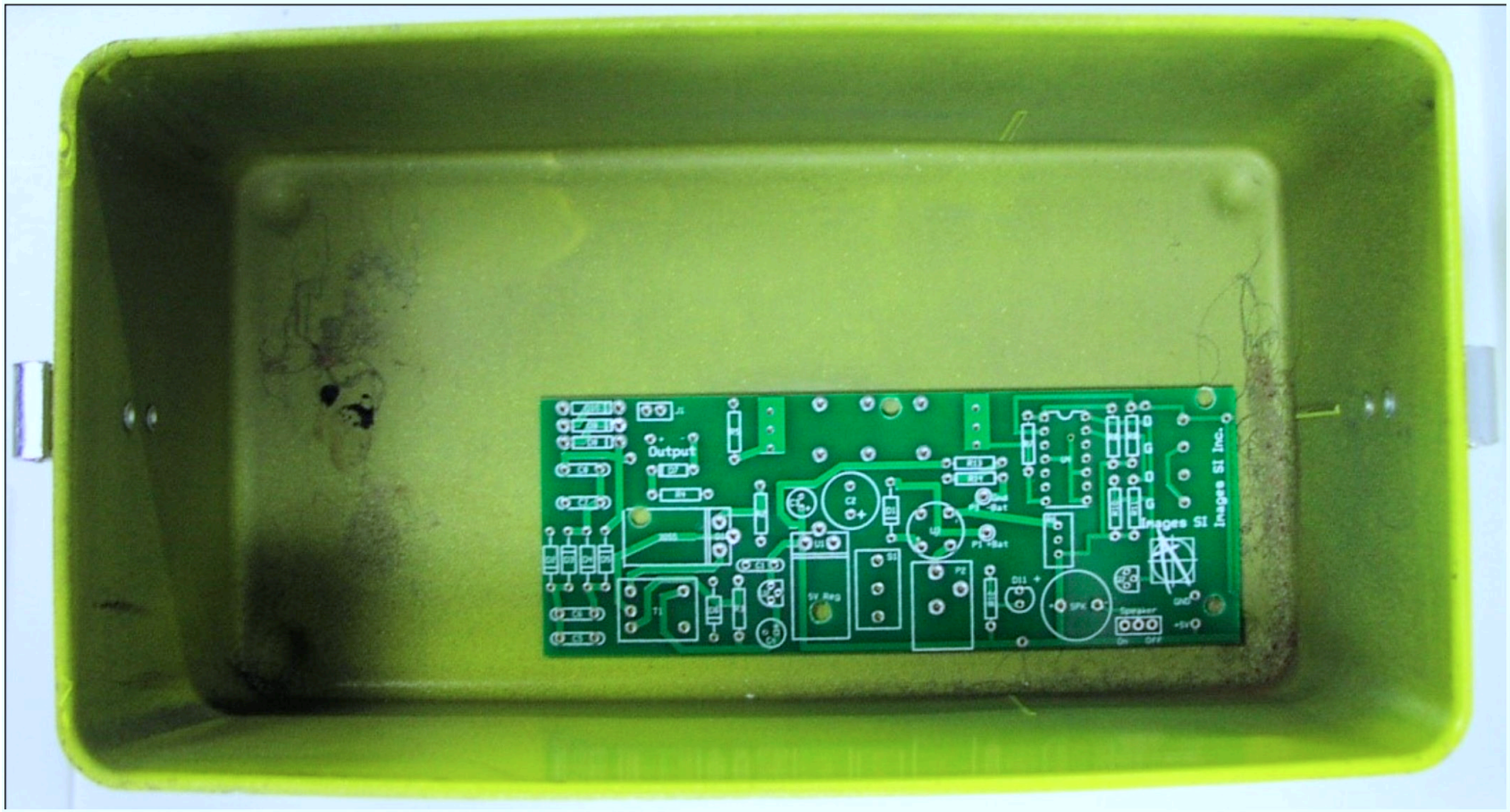
CDV-715 Retro Digital Geiger Counter : Page 5

Figure 5 Geiger Counter PCB mounting holes (red) and connections to Analog Digital Meter and external switch.



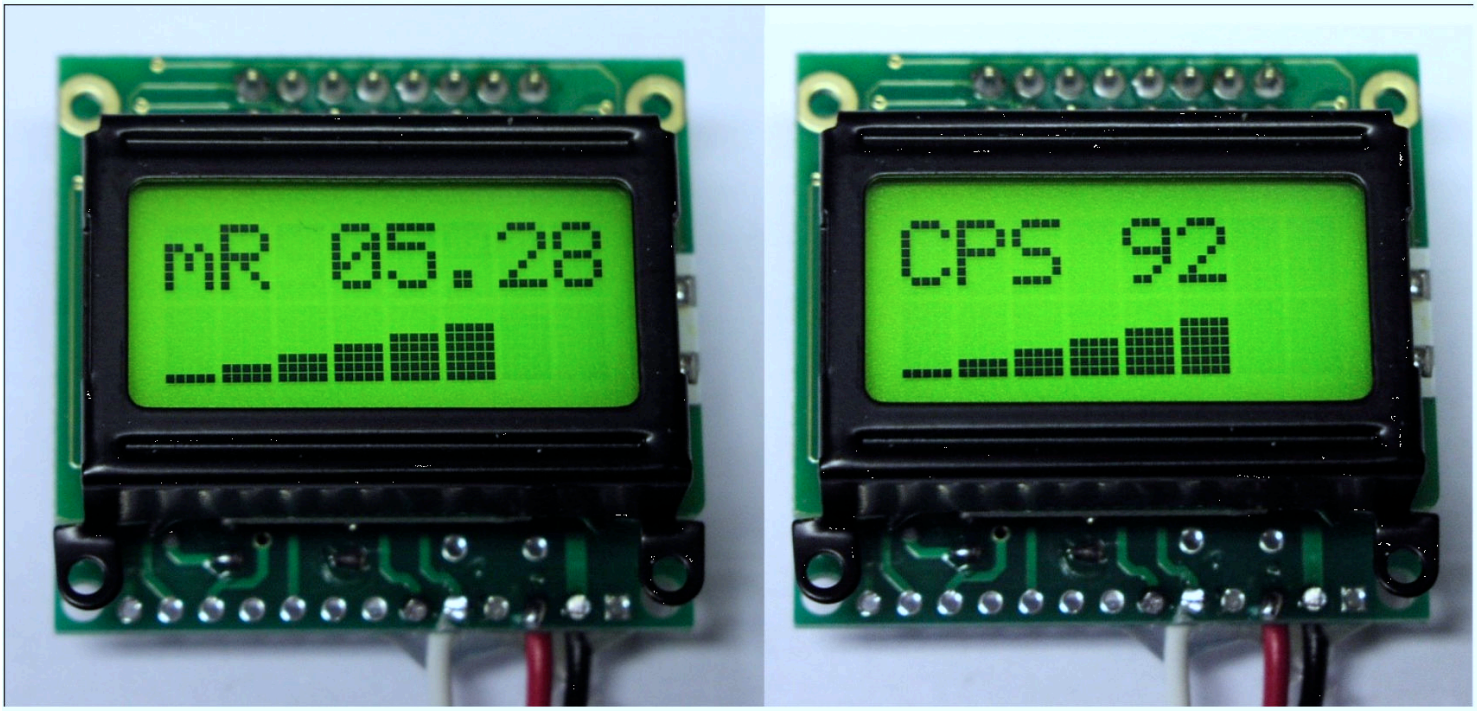
Place the pc board at the bottom of the CDV-715 case where you want to secure the pc board, see figure 6. Then use the holes in the PC board to mark the locations where you need to drill mounting holes for the 3/4" hex spacers to hold the PCB.

Figure 6 PCB in the bottom of CDV-715 case for marking mounting holes.



Do the same for drilling the holes for the 9V battery holder and GM Tube holder. The GM Tube holder I used was a 3/8" plastic cable holder. If I were using the LND712 GM tube I'd use a 1/2" plastic cable holder. Construct the Geiger counter board as per the instructions in the original article. There are a few minor changes are required You do not need the terminal block(s), the S1 switch or the speaker switch. The speaker switch should be jumped in the on position. (Alternatively, you could mount an external audio switch.) The S1 switch is replaced with an external rotary switch that is described in better detail later on in the retro-fitting section. You can solder two 9" wires in the S1 position for connecting the external switch. The terminal blocks are not needed, the pulse in wire from the Analog Digital meter is soldered directly into one of the "D" (digital output) pads used for the terminal blocks.

Figure 7 Analog Digital Meter (ADM)



When I first thought of doing this project, I tried mounting my standard 16x2 character LCD. This LCD meter display was too large to fit into the space allocated for the front panel meter. So I designed a new PC board that uses a smaller 8x2 character LCD to create an Analog Digital Meter see figure 7. The 8x2 LCD fits nicely into the allocated meter space.

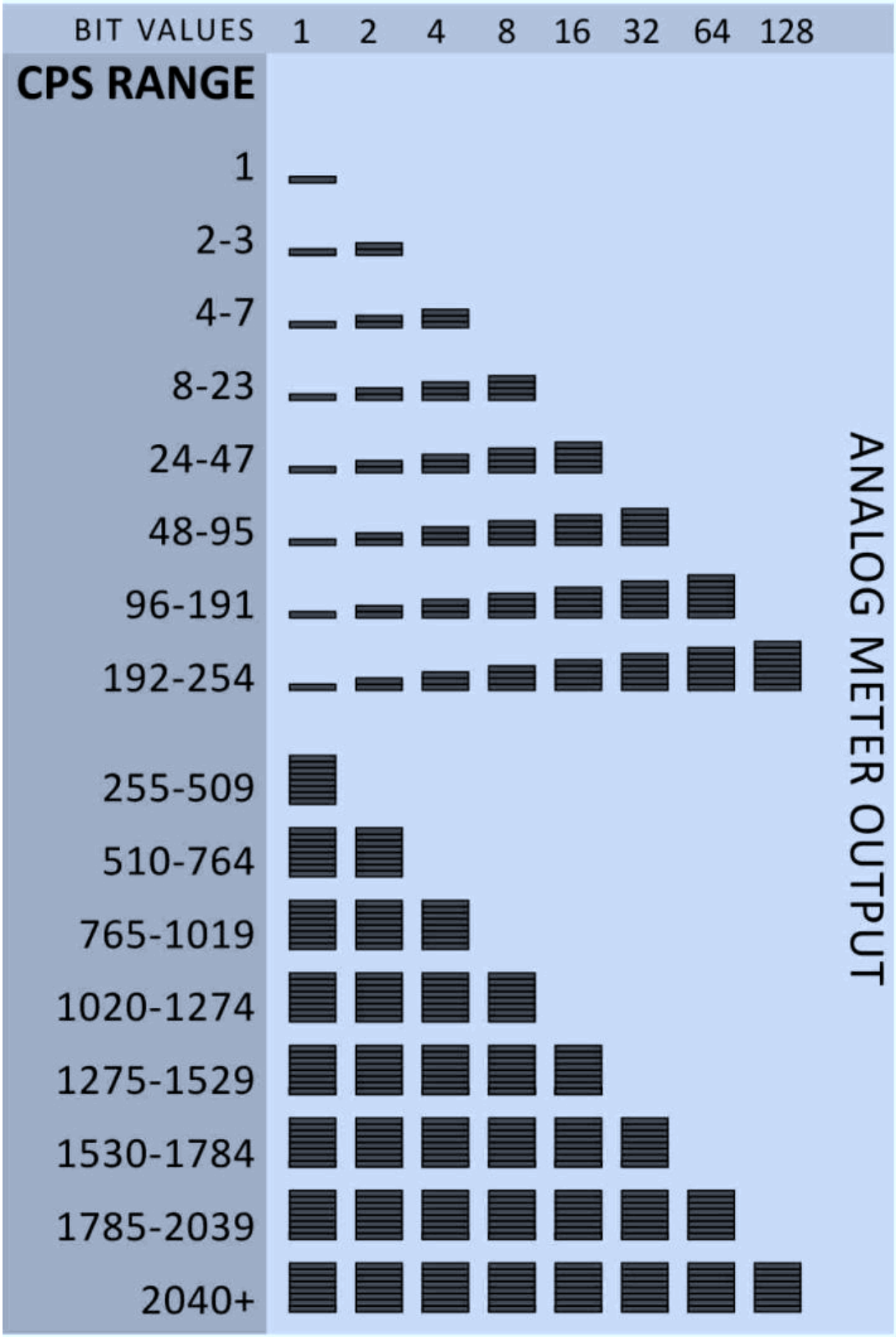
The smaller LCD presented new challenges regarding the display of information from the Geiger Counter. When using the 16 x 2 LCD display I had plenty of space to place the Count Per Second (CPS) on the top line and the equivalent radiation level in mR/hr (or mSv/hr) on the second line. In addition to this I wanted something that would replace an analog meter. I wasn't happy with the available analog meters or the electronics to implement them, so I decide to create my own.

The space allocated on the LCD's 8 character line doesn't permit me to write mR/hr, so I shorten this to mR. This left 5 characters to display the radiation level. I took a similar approach to displaying CPS. This left 4 character to display a CPS numerical value up to 9999, more than enough.

The second line of the 8x2 LCD is a dedicated analog power meter. To create the LCD analog meter I programmed 8 customer characters into the LCD. Each character represents a binary number: 1, 2, 4, 8, 16,32, 64 and 128. The chart below, see figure 8, provides an indication of how to read the power meter. Using the information we can obtain a reasonable approximation of CPS from 1 CPS to 2040 CPS from the second line of the Analog-Digital Meter. The chart below illustrates the CPS range capabilities of the ADM meter.

CDV-715 Retro Digital Geiger Counter : Page 8

Figure 8 CPS range display chart for Analog Digital Meter.



Switching from Imperial to Metric Measurements

If one places a jumper on the two pin header on the back of the Analog Digital Meter, the display will change from imperial measurements mR/hr to metric measurements mSv/hr. The mSv/hr is shorten to mS to fit on the 8 character line. The CPS reading stays the same regardless whether meter is set for imperial or metric.

Building the 8x2 LCD display:

Because the LCD is connected to and powered by our main Geiger counter board, there are a few components we can eliminate from the pcb and simplify its construction. The power and backlight switches S1 and S2 are eliminated and replaced with a jumper. Since we are pulling 5 volt power from the Geiger Counter board, we can also eliminate the voltage regulator U1 and input capacitor C2 shown on the PCB. What's left is a spoonful of components to mount to get the 8x2 LCD Analog and Digital Meter working. Figure 9, is the Analog to Digital PCB for the 8x2 LCD.

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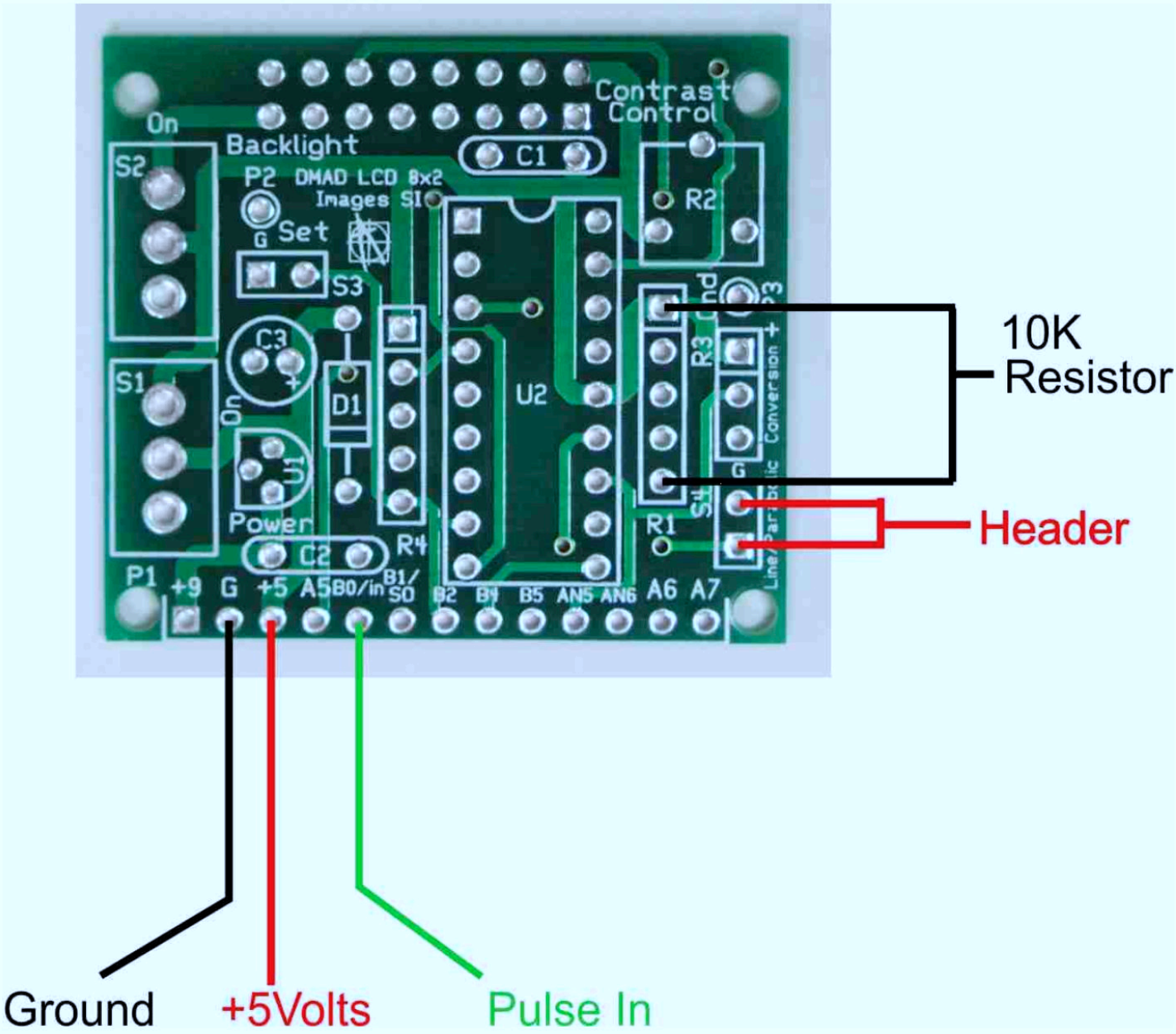
CDV-715 Retro Digital Geiger Counter : Page 9

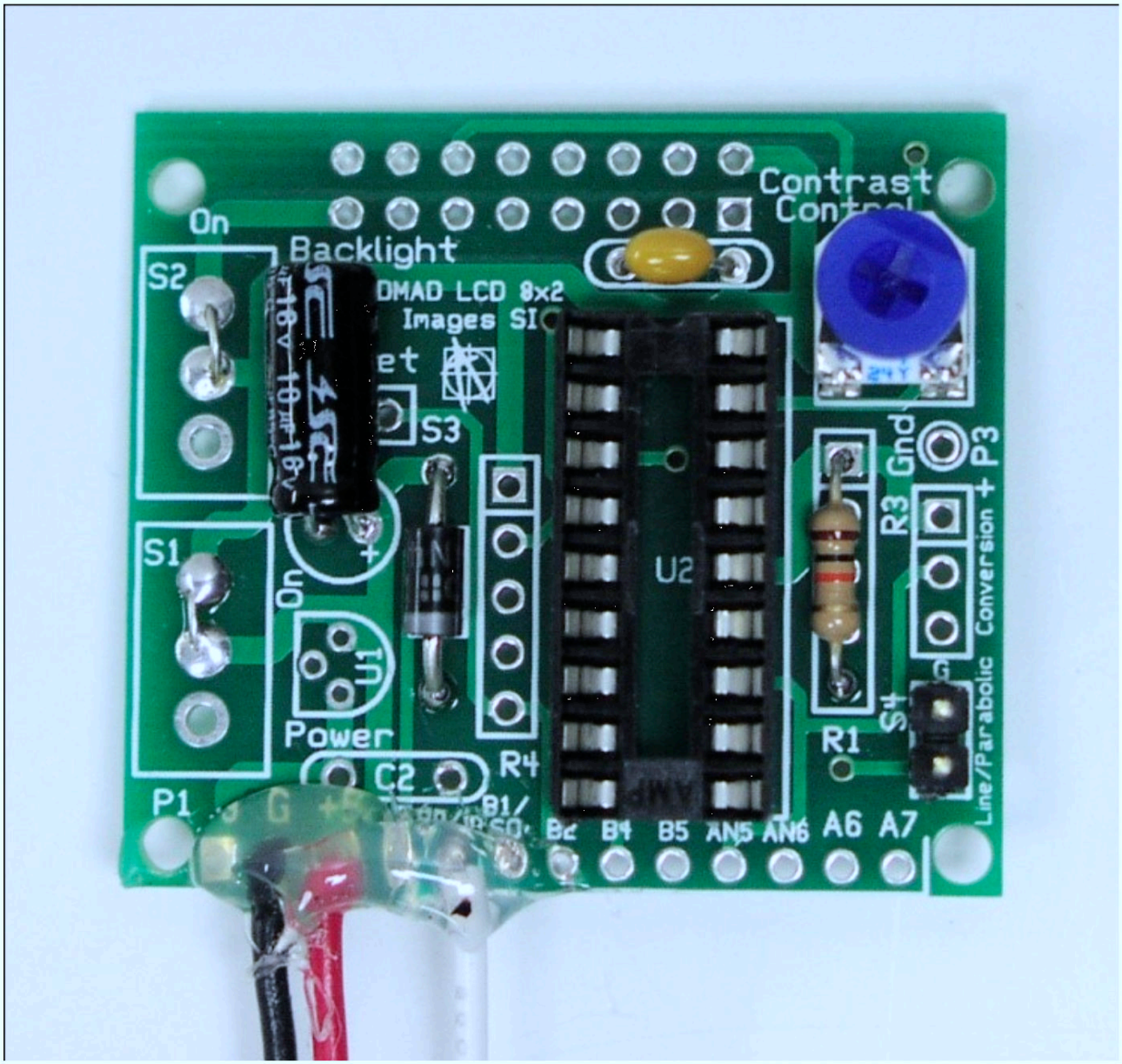
Figure 9 Analog Digital PCB for the 8x2 LCD



Begin by soldering a wire jumper on S1 and S2. Mount and solder the 18-pin socket on the pcb, align the indentation on the socket with the indentation shown on the silk screen outline. Next mount the 10K resistor in position shown. Next solder two position header. Next mount and solder potentiometer in the R2 position. Mount and solder diode D1. Next mount and solder the .1 uF capacitor C1.

CDV-715 Retro Digital Geiger Counter : Page 10

Figure 10 Mid construction photograph of the ADM pcb



Solder about 9 inches of 22 Gauge stranded wire to the ground pad, +5V pad and Pulse In pad. If you have color wire, use black, red and green wires respectively. At this point your ADM pcb should look like figure 10. All that is left is to solder the headers for mounting the LCD and inserting the pre-programmed chip into the IC socket.

Flip the PCB over, mount and solder two 8-pin headers into the pcb, see figure 11.

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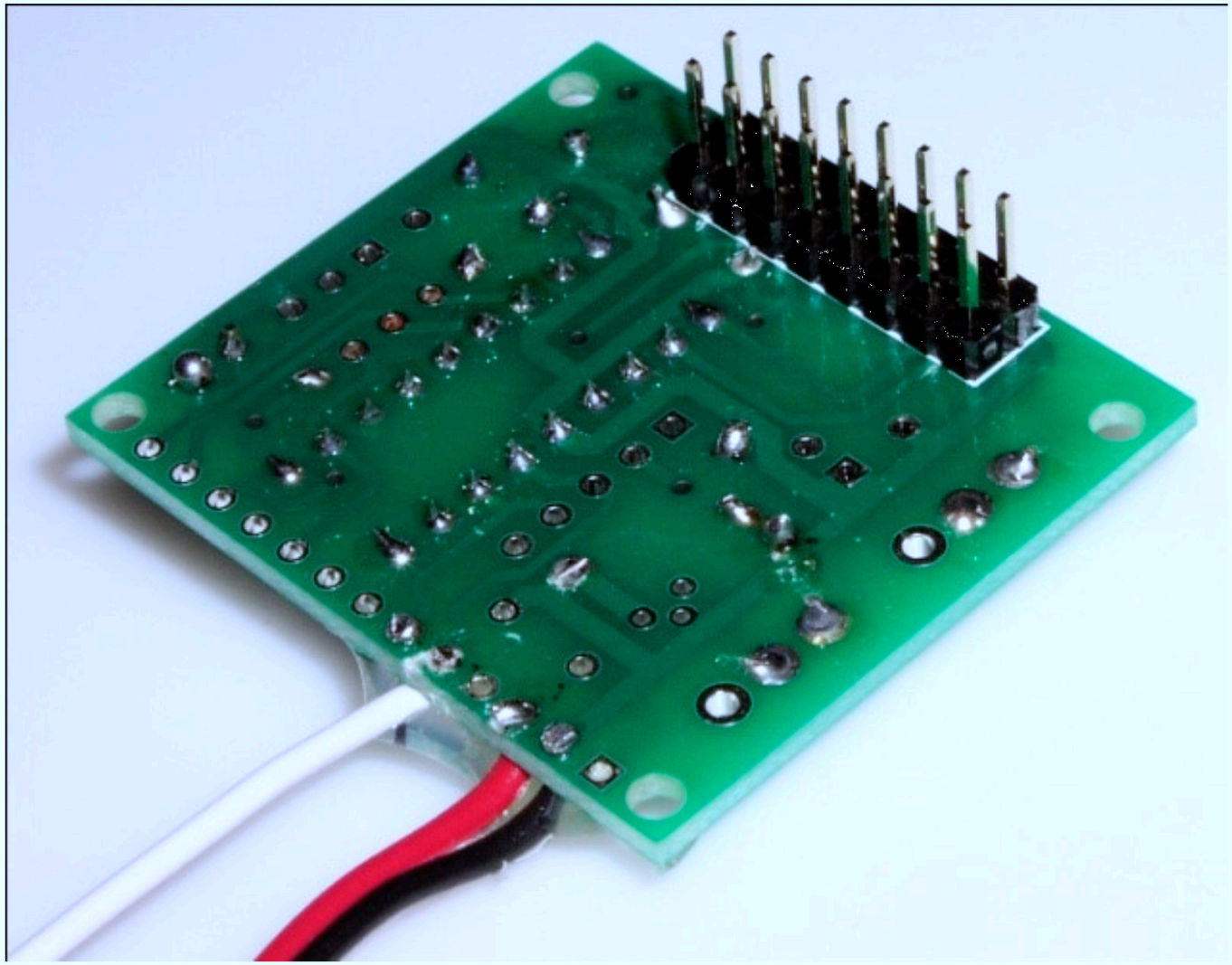
CDV-715 Retro Digital Geiger Counter : Page 11

Figure 11 Mount and Solder two 8-pin headers



Next mount and solder the LCD to the 2x8 header pins, see figure 12.

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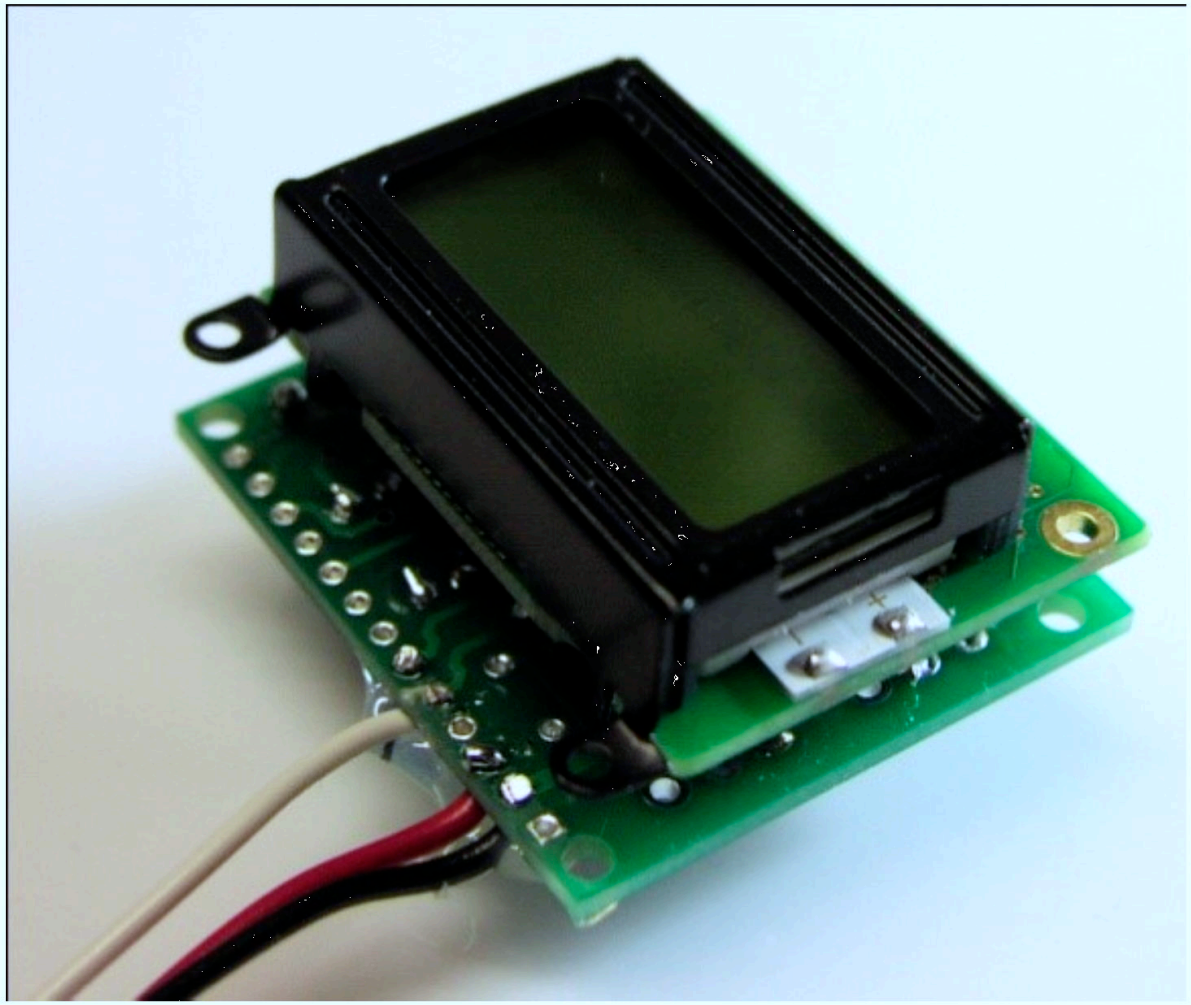
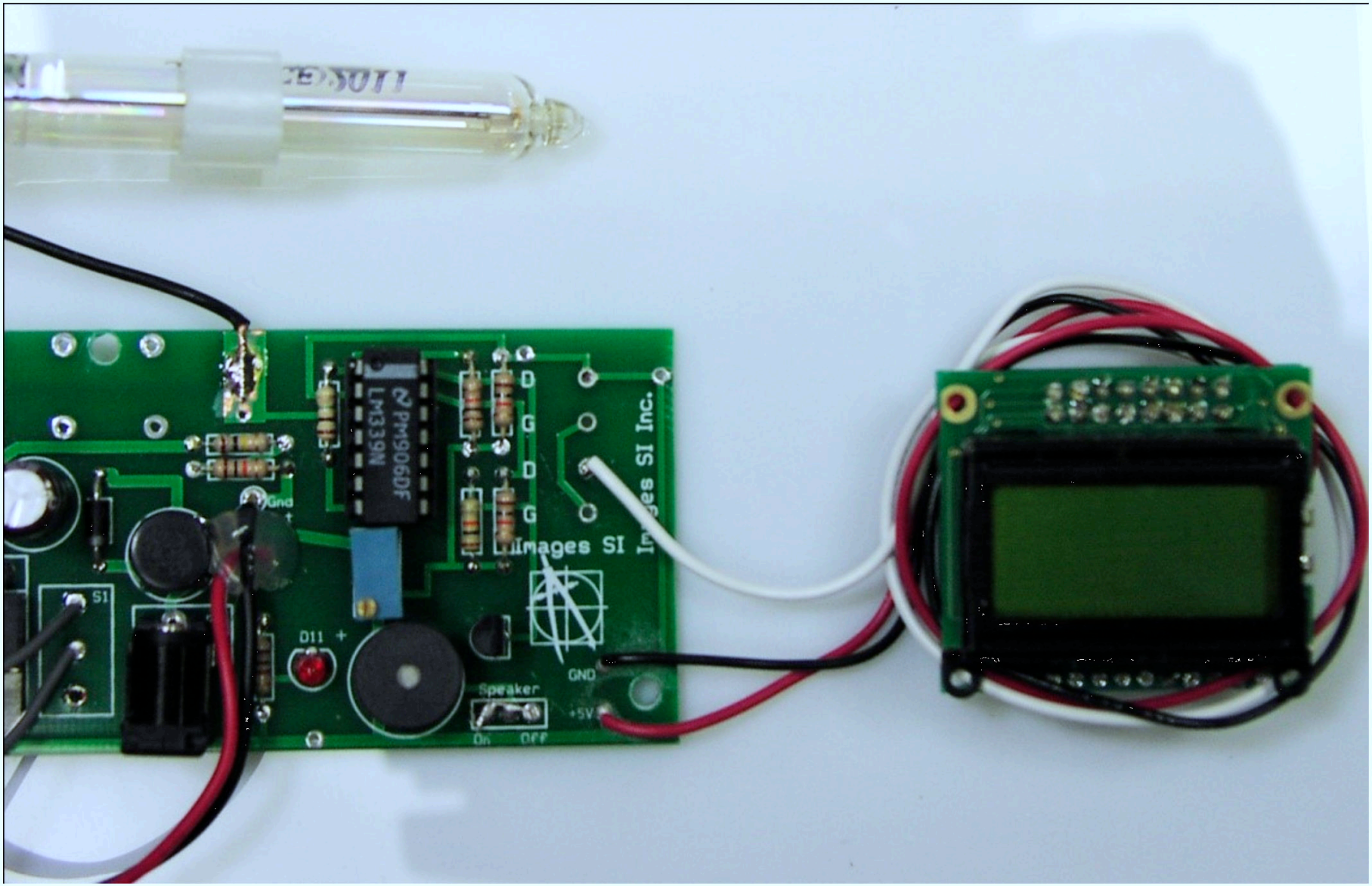
Figure 12 Mount and solder LCD to header on ADM pc board.



Connecting the ADM to Geiger Counter Board.

The GCK-02 board has a 5V output and ground pad, look back at figure 5. Connect the 9" length of red wire from the Analog Digital meter to the +5V pad on the Geiger counter board. Connect the 9" length of black wire from the Analog Digital meter to the ground pad on the Geiger counter board. Connect the 9" length of white wire from the Analog Digital meter to one of the "D" pads (digital output) on the Geiger counter board, see figure 5. The finished connection between the ADM and GCK-02 is shown in figure 13.

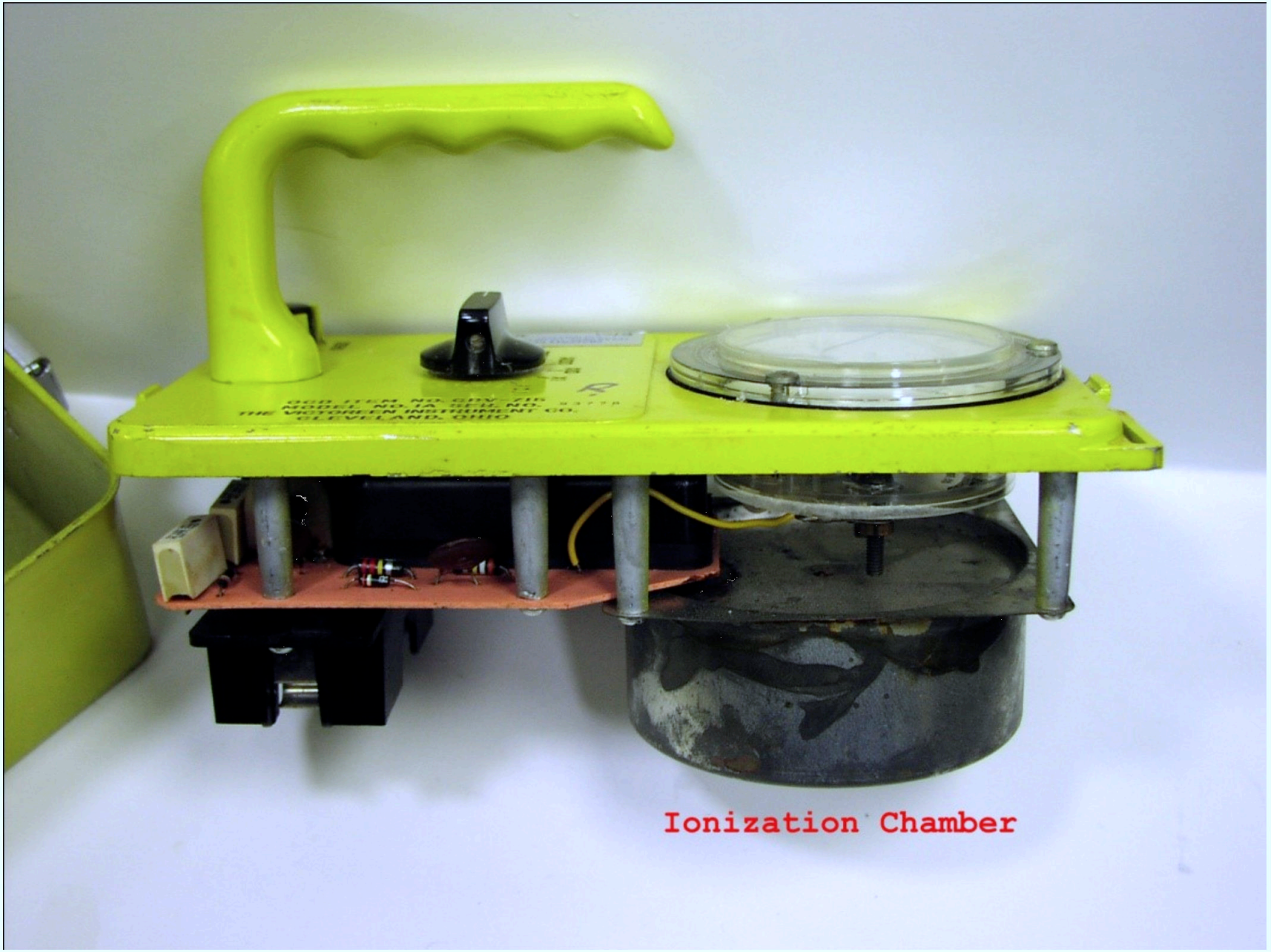
Figure 13 Analog Digital Meter connected to GCK-02 circuit board.



Preparing the CDV-715 Case and Power switch.

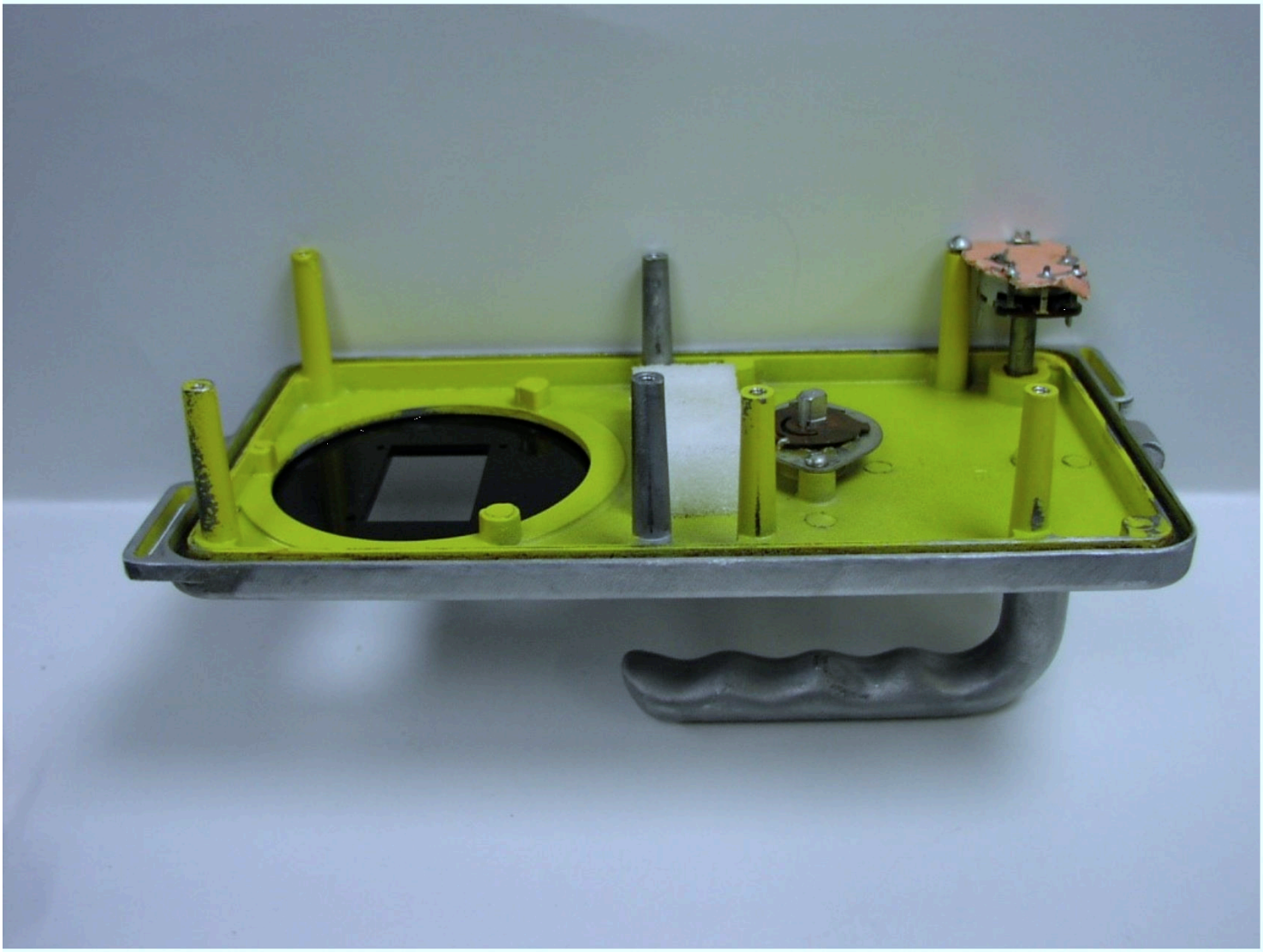
When you open the CDV-715 case it will resemble figure 14.

Figure 14 Open CDV-715 instrument.



Remove, circuit board, ionization chamber and panel meter, see figure 15. Keep the screws for the panel meter.

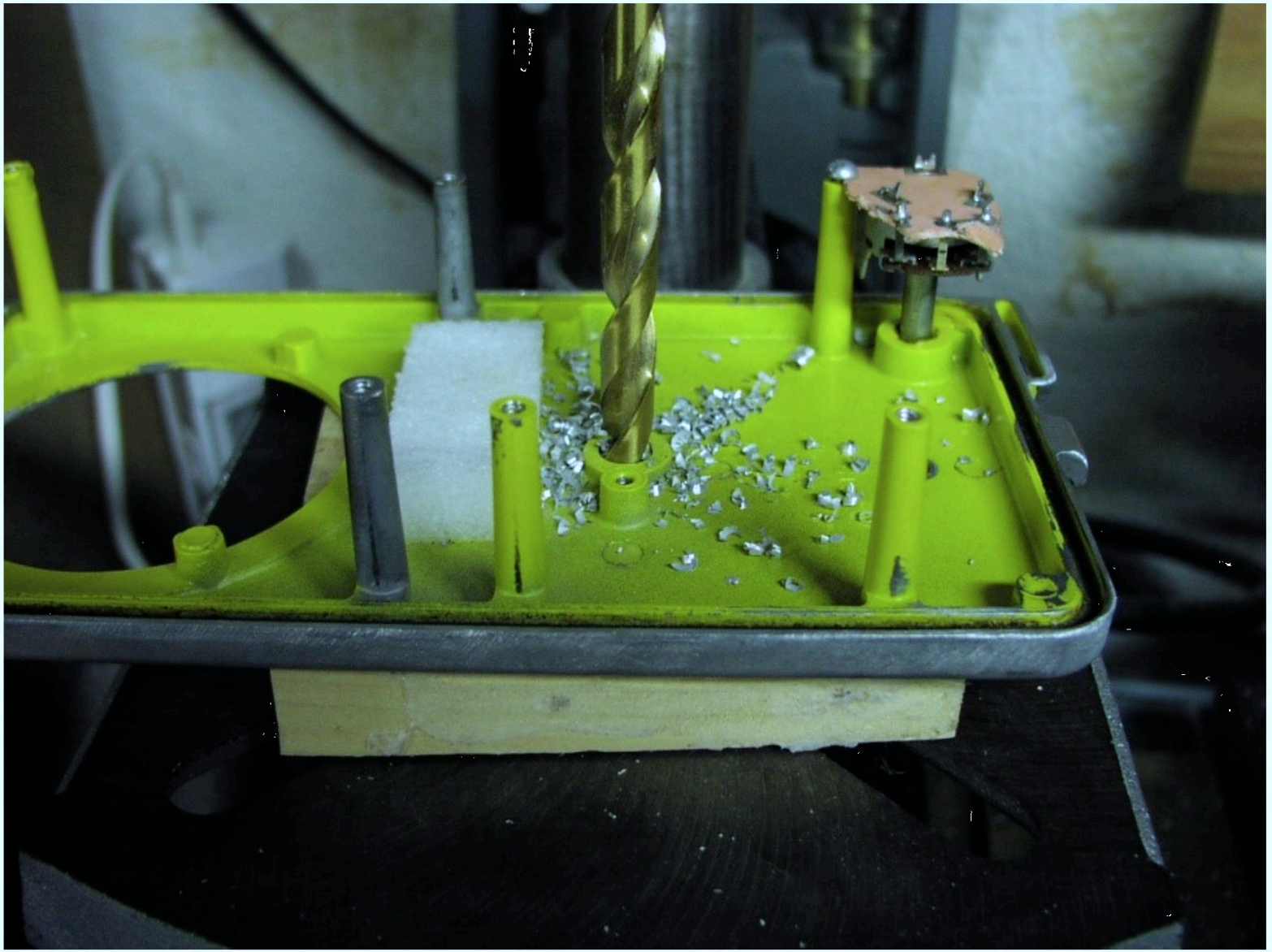
Figure 15 CDV-715 with circuit board, ion chamber and the meter removed.



The CDV-715 has a rotary power, the switch was integrated with the old PCB so its not useable for our circuit.

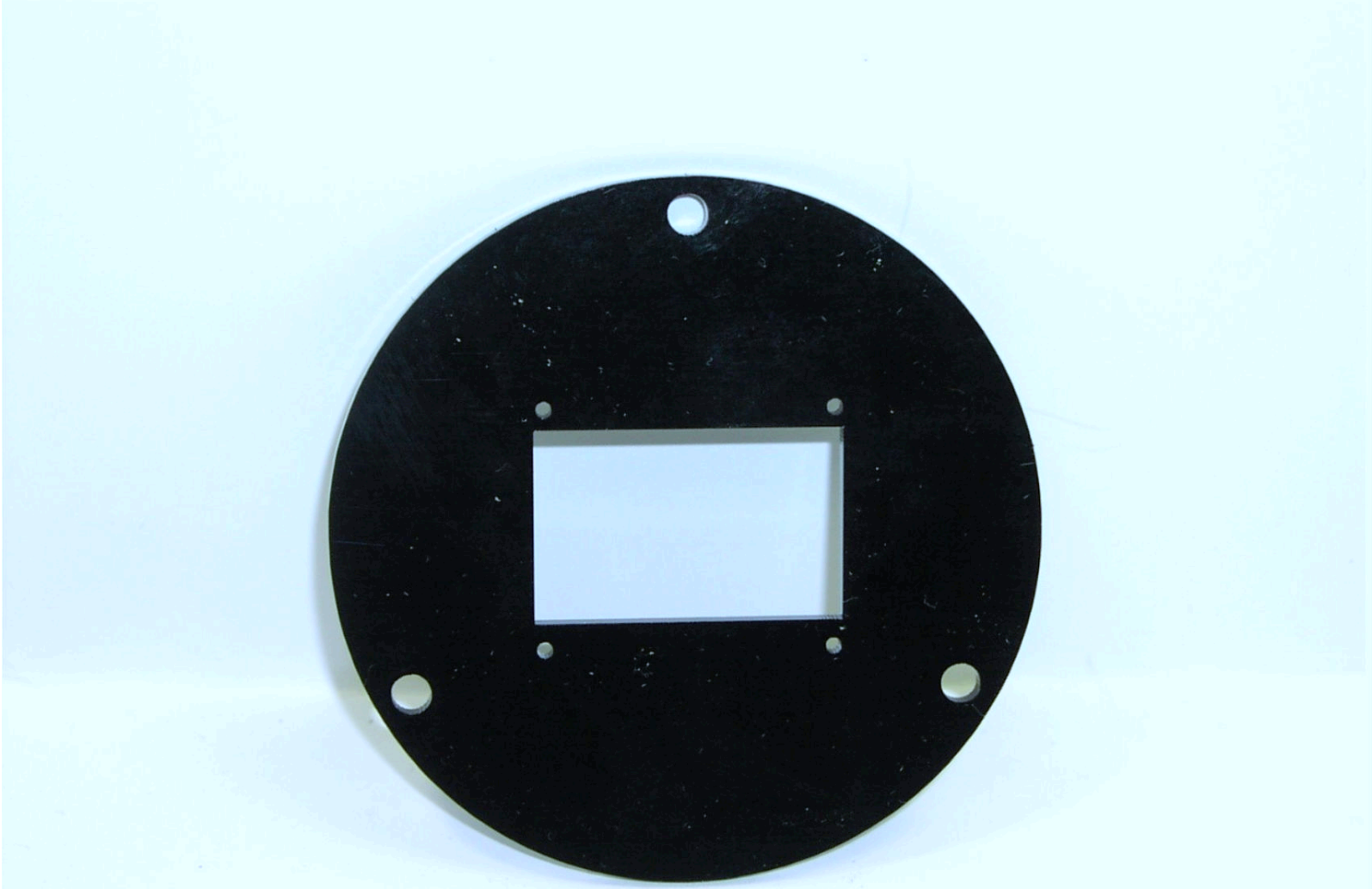
I wanted to keep a rotary switch in the same position for the retrofit to keep the overall look the same. I removed the old switch fixture and reamed the hole to 3/8" to accept the new switch. The thickness of the case prevented using the face plate nut to secure the switch. Rather than create a bracket for the rotary switch I glued the rotary switch into position.

Figure 16 Reaming existing hole to accept the new rotary switch



With the switch mounted it is time to begin assembling the unit together. The panel meter is replaced with a faceplate that has holes for mounting the Analog Digital Meter. The three holes along the circumference align with the screw holes in the case, see figure 17

Figure 17 Laser cut panel meter to hold ADM



The Analog Digital meter is attached to the inside of the faceplate using four 0-80 machine screws and nuts, see figure 18.

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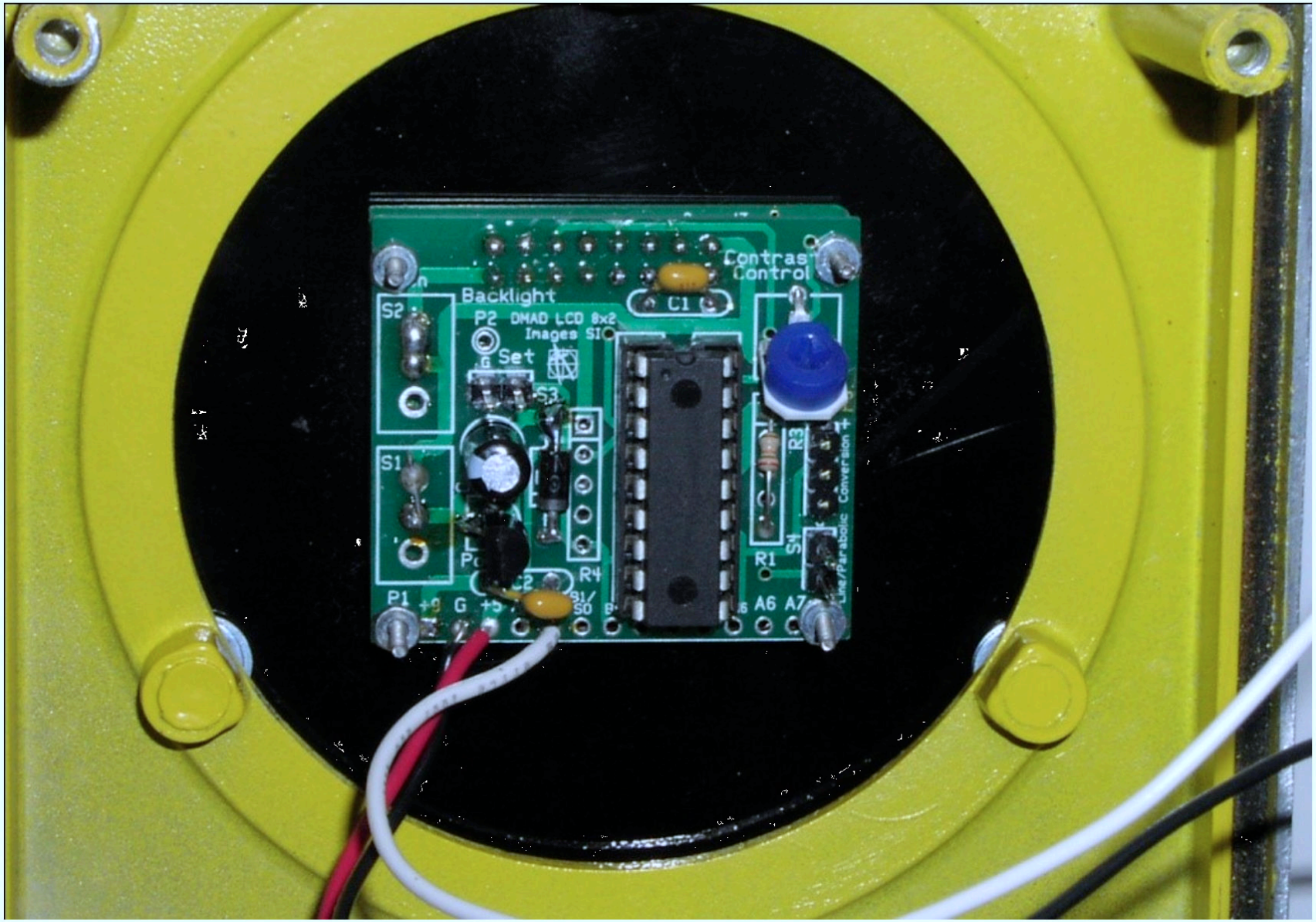
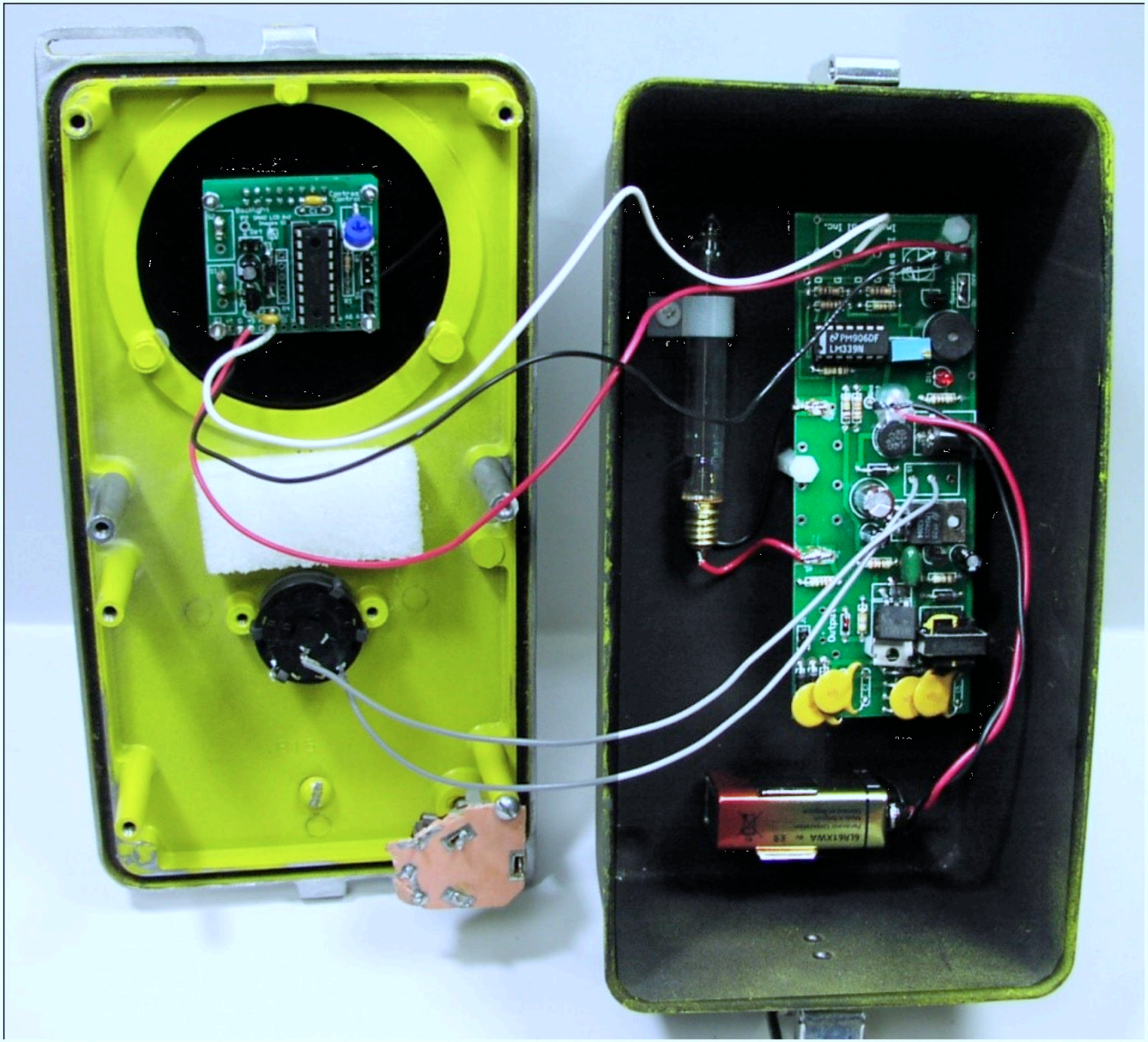
Figure 18 Analog Digital Meter secured to faceplate using 0-80 machine screws and nuts



In the final assembly attach the PC board to 3/4" hex standoffs using 4-40 nuts, the battery clip and the GM Tube to the inside of the CDV-715 Case, see figure 19.

Figure 19 Open enclosure view of finished retrofit circuit.



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selection switch allows Counts Per Second (CPS) or Counts Per Minute (CPM) mode.

CASE SIZE: The GCA-07W measures 7 ½" (length) x 4.1" (width) x 1 ¼" (height).

INTERNAL SENSOR: The internal sensor makes it easier to search materials and to detect surface contamination.

COUNTING RANGE: 1 Count Per Minute (CPM) To 10,000 Counts Per Second (CPS).

RADIATION RANGE: 0.001 mR/hr resolution to 1000 mR/hr Range (Imperial Measurements); 0.01 uSv/hr resolution - 10 mSv/hr range (Metric Measurements).

GCA-07W Professional Digital Geiger Counter

Coincidence Circuit

GCA-07

GCA-06

GCA-03

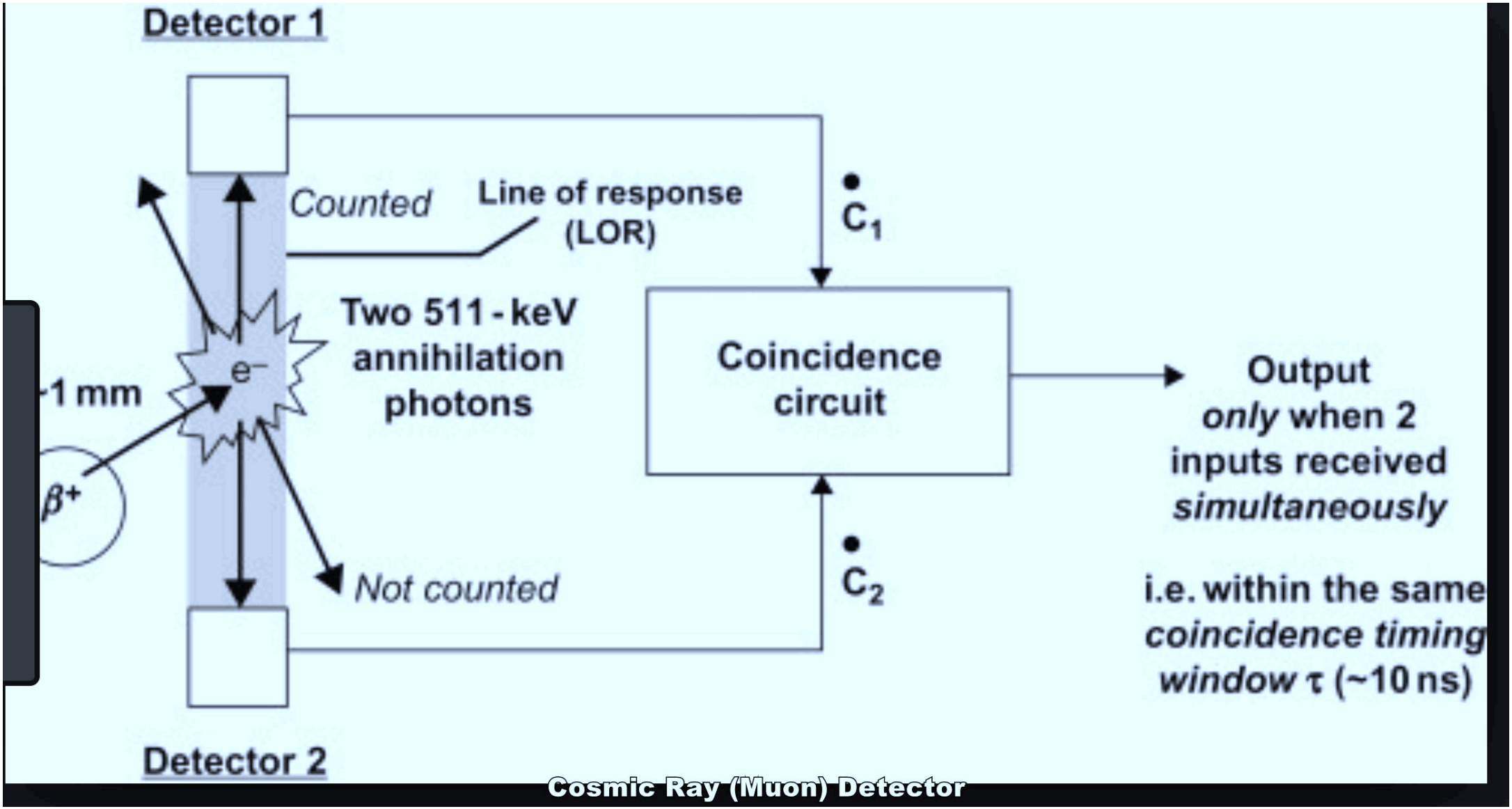
GCA-01

Geiger Counter Kits

Our coincidence detector has two pulse inputs and one pulse output. When two pulses are presented on the inputs at the same time, an output pulse is generated. Coincidence circuits are used in nuclear physics experiments. Two examples of applications for a coincidence circuit are a gamma ray telescope and a quantum entanglement experiment.

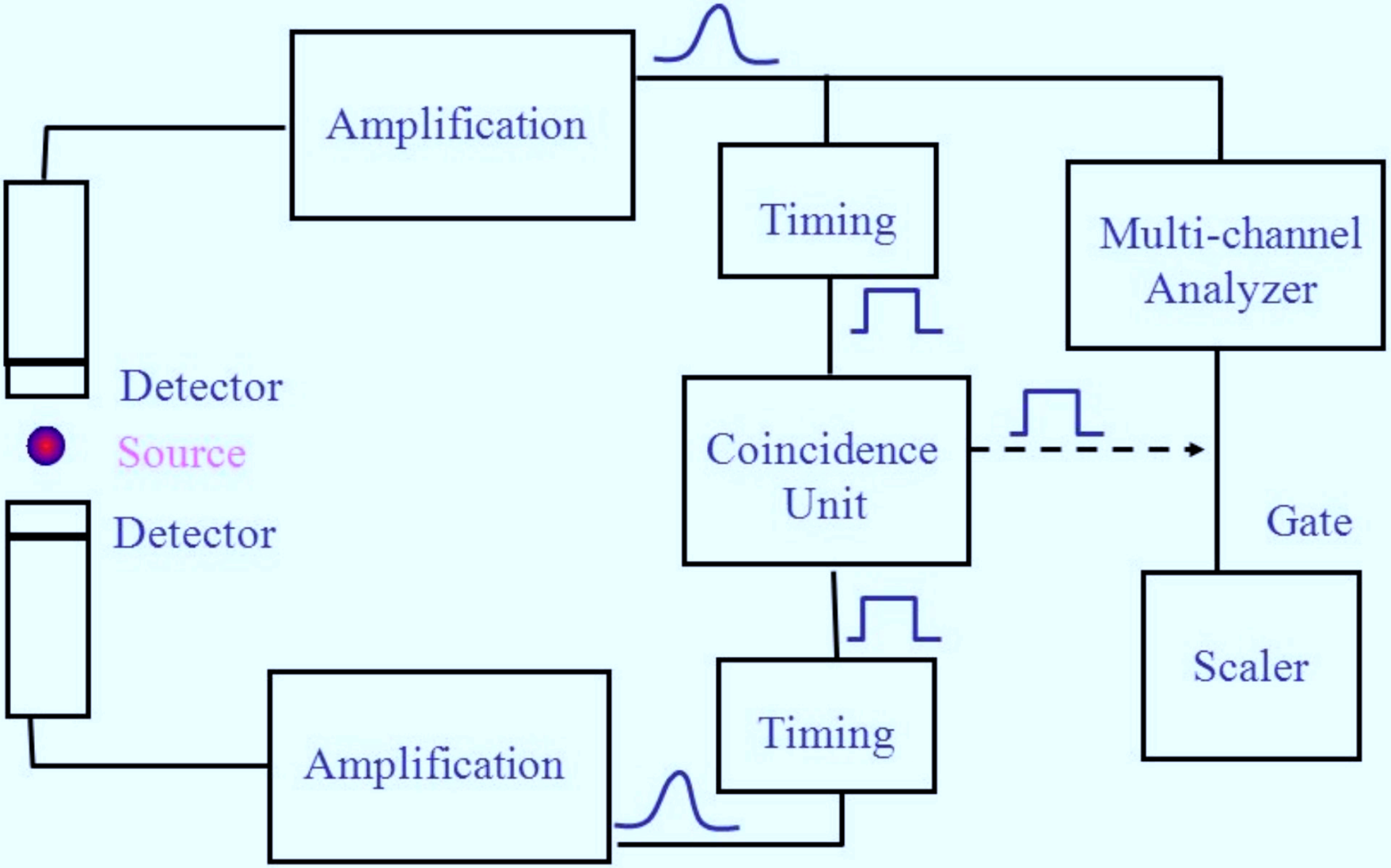
Build your own quantum entanglement experiment - Page 1
Build your own quantum entanglement experiment - Page 2

The concept of the "method of coincidence" was developed by German physicist Walther Bothe in 1929, for which he received the 1954 Nobel Prize in Physics. Bruno Rossi invented the first electronic coincidence circuit in 1930.

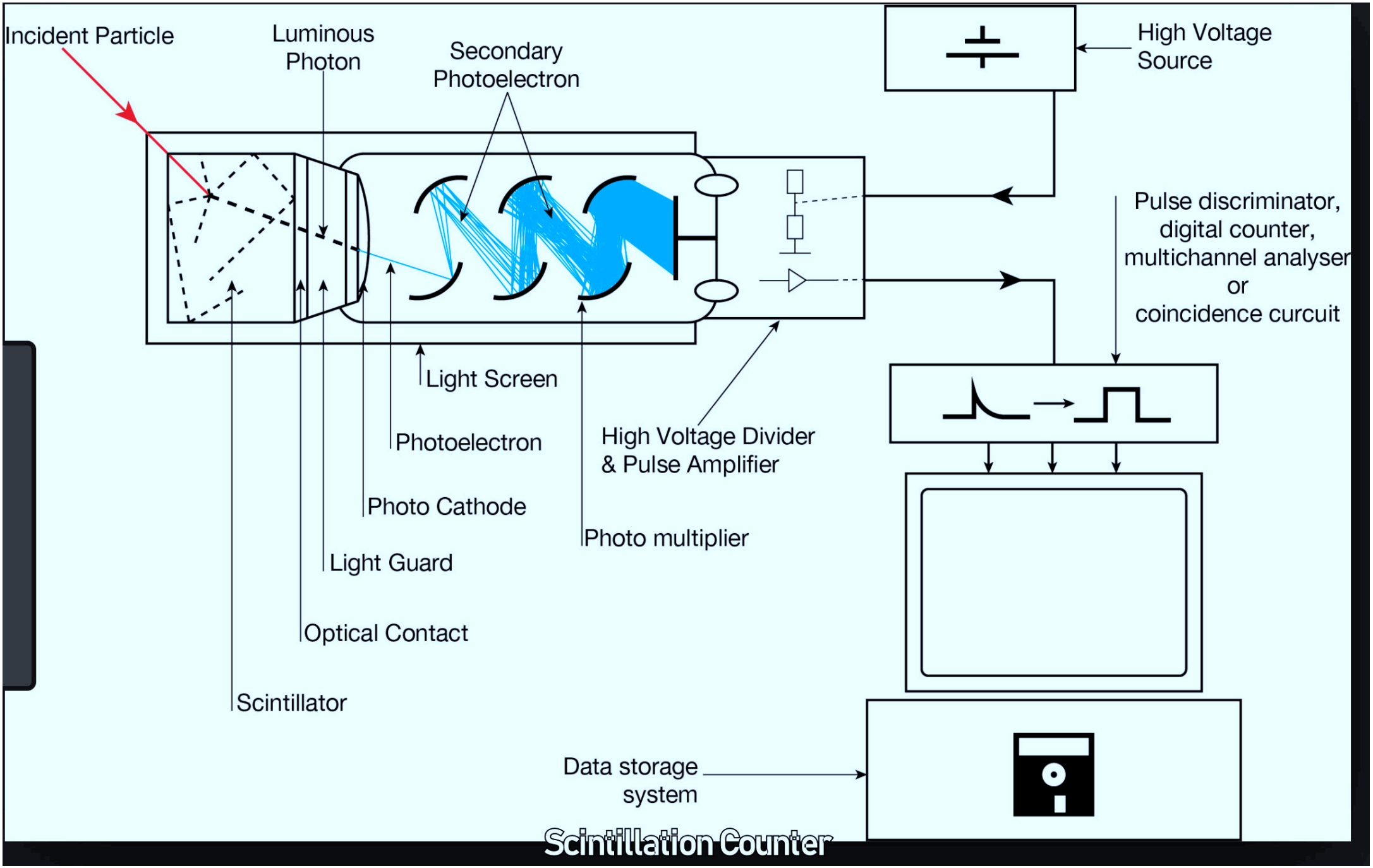


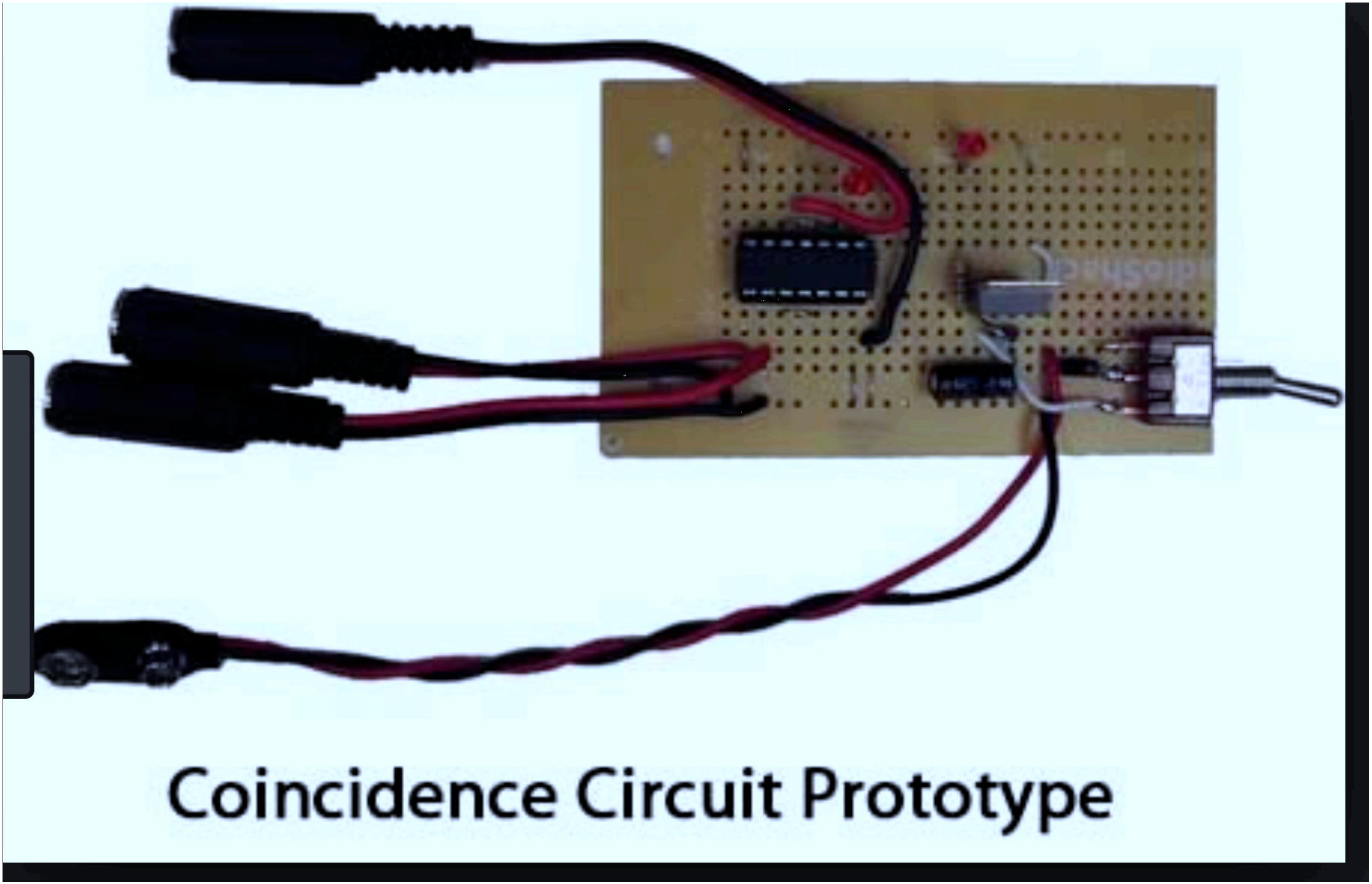
Cosmic Ray (Muon) Detector

A simple coincidence circuit



After Tsoulfanidis, 1995


Incident Particle
Luminous Photon
Secondary Photoelectron
High Voltage Source
Pulse discriminator, digital counter, multichannel analyser or coincidence curcuit
Light Screen
Photoelectron
High Voltage Divider & Pulse Amplifier
Photo Cathode
Photo multiplier
Light Guard
Optical Contact
Scintillator
Data storage system
Scintillation Counter



Coincidence Circuit Prototype

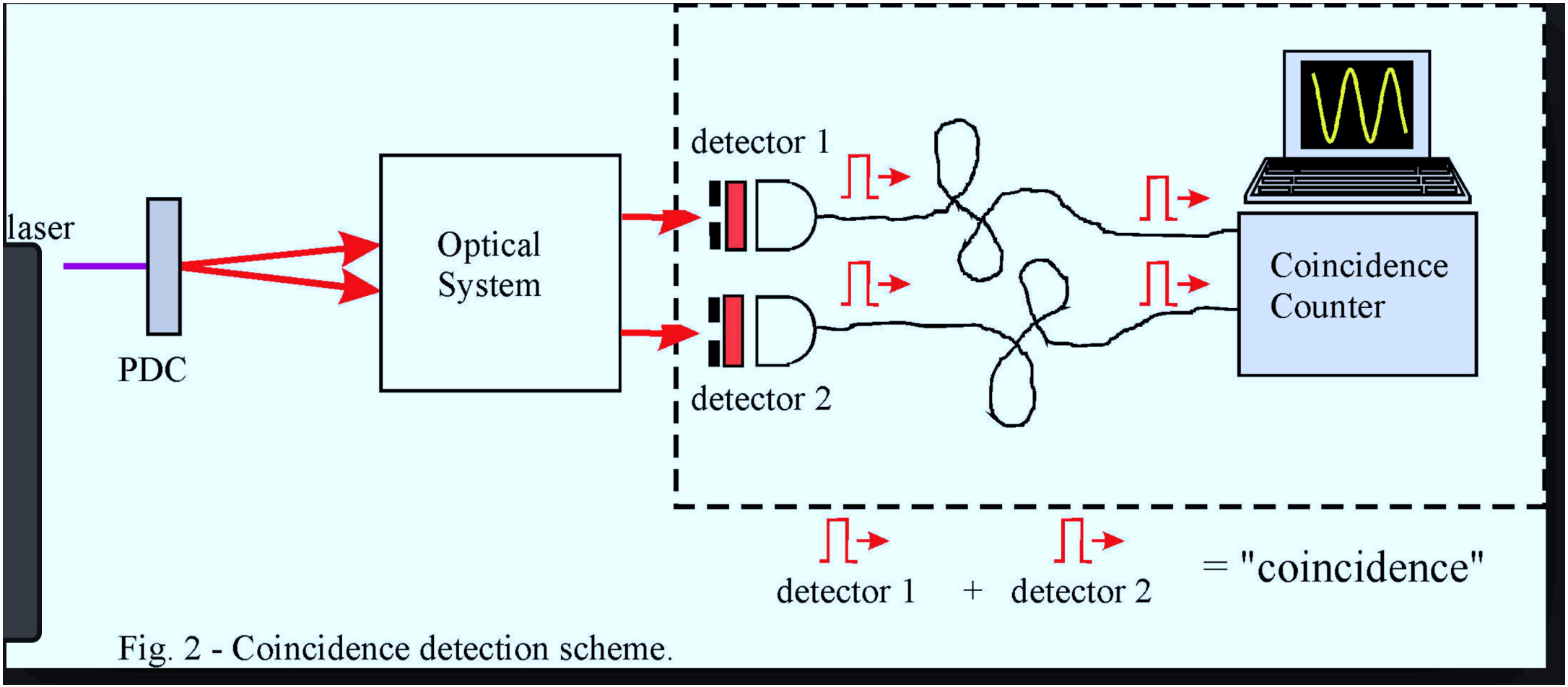


Fig. 2 - Coincidence detection scheme.

coincidence circuit

- In physics, a **coincidence circuit** is an electronic device with one output and two (or more) inputs. The output is activated only when signals are received within a time window accepted as *at the same time* and in parallel at both inputs. Coincidence circuits are widely used in particle physics experiments and in other areas of science and technology.

GCK-01-01 Parts List

(1) PCB-66	
(1) GMT-01	
(1) self adhesive black vinyl strip	
R1, R4	1K 1/4W Resistor (2)
R2, R5, R6, R7, R8, R12, R19	10K 1/4W Resistors (7)
R9	15K 1/4W Resistor (1)
R3, R11	1 Mega Ohm 1/4W Resistor (2)
R13	100K 1/4W Resistor (1)
R15, R21	330 Ohm 1/4W Resistors (2)
R16	10 Mega Ohm 1/4W Resistor (1)
R17	5.6K 1/4W Resistor (1)
R18	4.3K 1/4W Resistor (1)
R20	470 Ohm 1/4W Resistor (1)
R14	1 Meg 25-Turn Pot. (1)
C1, C2, C10	0.1uF 50V Capacitors (3)
C3, C4, C5	0.01uf 1KV Capacitors (3)
C6	220uF 10V Capacitor (1)
C7	22uF 50V Capacitor (1)
C8, C12	0.01uf 12V Capacitors (2)
C9	0.0047uf 100V Capacitor (1)
C11	0.047uF Capacitor (1)
D2	1N751 5.1V Zener Diode (1)
D3	Red Subminiature LED (1)
D4, D5	1N4007 Diodes (2)
D6	1N5271 Diode 100V Zener (1)
D7, D8	1N5281 Diodes 200V Zener (2)
D9	1N5817 Diode (1)
D10	1N914/1N514 Diode (1)
U1	LM339 (1)
	14 pin socket (1)
U2	W01M - Bridge Rectifier (1)
U3	7805 Voltage Regulator (1)
U4	4049 (1)
	16 pin socket (1)
U5	LM555 Timer (1)
	8 pin socket (1)
Q1, Q3, Q4	2N3904 Transistors (3)
Q2	IRF830 (1)
J1, J2	Jack-05 Audio Jack (2)
P2, P10	2 pin headers (2)
P7	PJ-102B power jack (1)
P8	SPK-05 speaker (1)
S2, S3	SW-07 toggle switches (2)
T2	HVT-03 transformer (1)
P9, P12	BAT-01 battery clip (1)

Additional parts included for alternate configurations.

Images Scientific Instruments Inc.
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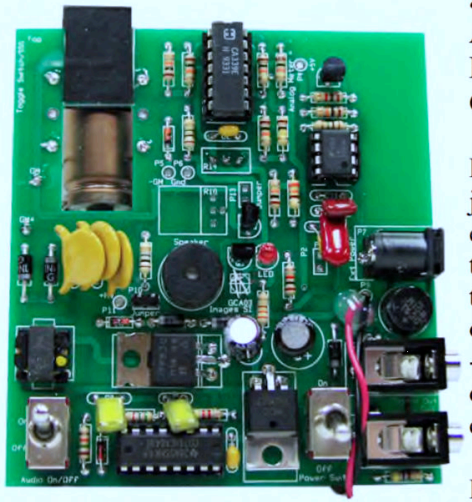
718.966.3695 Fax
www.imagesco.com

Construction Manual and Users Guide Model GCK-01-01 Analog Geiger Counter



Features:

Detects: Alpha, Beta, Gamma and X-Rays.
Alpha radiation above 3.0 MeV
Beta radiation above 50 KeV
Gamma radiation above 7 Ke

Digital Output -- The digital output jack provides a TTL logic high pulse each time a radioactive particle is detected. The digital output may be interfaced to a Personal computer (PC) or a microprocessor using our DMAD - Digital Meter Adapter. Free Windows based radiation monitor and charting programs available.

External Power Jack

Headphone Jack

Standard Output -- Geiger Counter clicks and blinks an LED each time a radioactive particle is detected.

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Installing/Changing the Battery……...14
GCK-01-01 Parts List…..……15

When you are satisfied that the circuit is working properly, it can now be mounted in a suitable housing. The following instructions are for mounting inside Images SI's Analog Geiger Counter Case.

Mount the PC board to the front of the case. The shafts of the two PC mounted switch and LED should fit into the pre-drilled holes. The PCB is held to the case front using the two nuts to the PC mounted switches.

Finish by placing the 9-volt battery cap into the battery compartment of the back case. Close the case and secure with case screws.

Installing /Changing Battery

To install or change battery open battery compartment on the back of the Geiger counter and install or replace battery, see Figure 10.

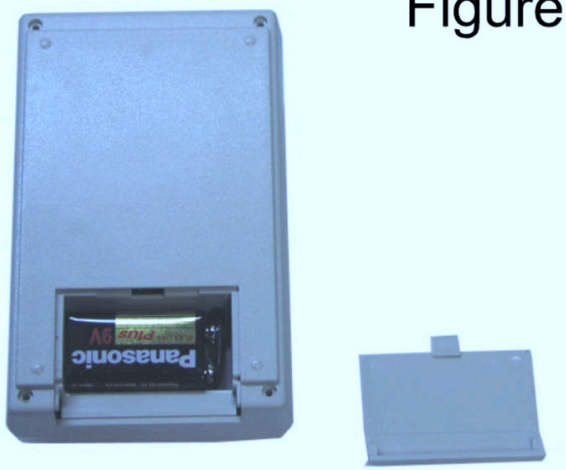


Figure 10

Before mounting the PCB inside the case, check to make sure the entire Geiger Counter circuit functions. To do this you may use either our Digital Meter Adapter (DMAD-04) or Analog/Digital Meter (ADM-01). The DMAD-04 plugs into the Digital Output (J1) of the GCK-01. The ADM-01 is connect to the PCB using the wiring diagram found in the ADM-01 Manual.

Calibrating your GCK-01-01 Using an ADM-01 or DMAD-04 Meter

We can use a simple procedure to get an approximate calibration for the analog/digital meter. The difficulty in calibrating the meter has much to do with the variables in play. The tube's response can vary +/- 20 %. The strength of the radioactive source can also vary in addition to variations in our electronic components. All these factors affect accuracy. With this being said, we can proceed to get that approximation for our Geiger counter.

Our calibration procedure uses a 10 uCi CS-137 source. Any radioactive material (see Finding Radioactive Sources) may be used for this procedure. To begin hold your radioactive source against the GM tube as close as possible. You may need to use a rubber band or tape to hold the source in place. Adjust the potentiometer at R14 until you obtain the highest possible CPS (Counts per Second) reading on the meter.

Now remove the radioactive source and move it away from the GM tube to the point that it no longer affects the meter readings. Check background radiation. Normal background radiation for our facility ranges from 15-35 CPM; background radiation levels vary from location to location and are dependent on a variety of factors. A simple internet search of "normal background radiation levels" with your location will provide you with data specific to you.

While checking for background radiation, you should also check that the meter is reading single pulses. If you are getting double pulses the majority of the time, turn the potentiometer down. If you are consistently getting high background readings, check that your radioactive source has been placed out of range and then turn the potentiometer until you have reached acceptable norms.

The Geiger Counter

Geiger Counters are instruments that can detect and measure radioactivity. H. Geiger and E.W. Muller invented the Geiger counter in 1928.

When you are finished building your Geiger Counter kit you can use it to check materials and environment for radioactivity. Geiger counters are useful in performing experiments with radioactivity and nuclear energy. You could even go prospecting for uranium, if you desire.

Radioactivity

Radioactivity is the spontaneous emission of energy from the nucleus of certain elements, most notably uranium. There are three forms of energy associated with radioactivity; alpha, beta and gamma radiation. The classifications were originally made according to the penetrating power of the radiation.

Alpha rays were found to be the nuclei of helium atoms, two protons and two neutrons bound together. Alpha rays have a net positive charge. Alpha particles have weak penetrating ability; a couple of inches of air or a few sheets of paper can effectively block them.

Beta rays were found to be electrons, identical to the electrons found in atoms. Beta rays have a net negative charge. Beta rays have a greater penetrating power than Alpha rays and can penetrate 3mm of aluminum.

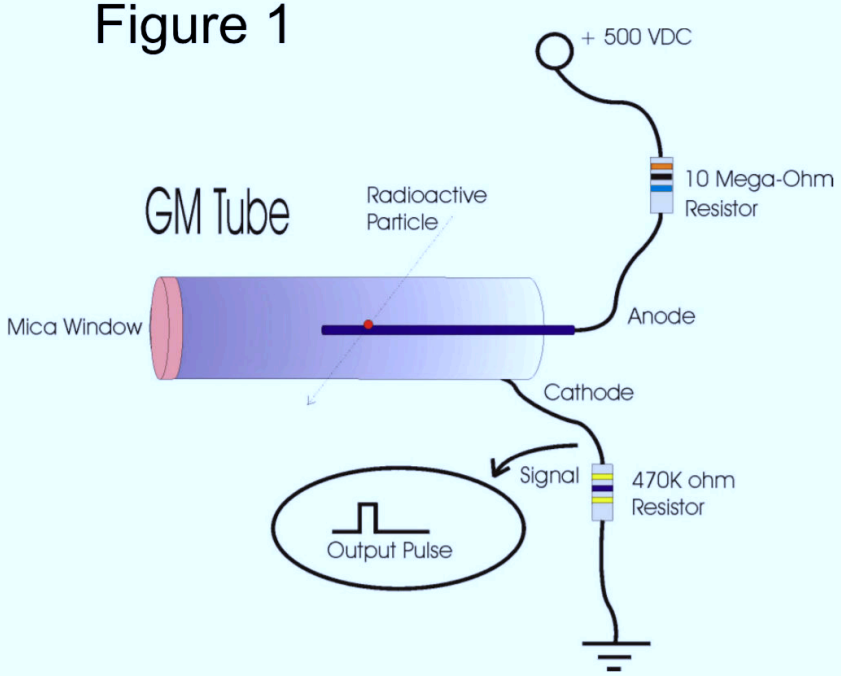
Gamma rays are high-energy photons. This has the greatest penetrating power being able to pass through several centimeters of lead and still be detected on the other side.

Images Geiger Counter Model GCK-01-01 is sensitive to all three types of radioactivity.

Geiger Tube

The Geiger Mueller (GM) tube hasn't changed much since it was invented in 1928. The operating principle is the same. A cutaway drawing of the tube is shown in figure 1. The wall of the GM tube is a thin metal cylinder (cathode) surrounding a center electrode (anode). It is constructed with a thin Mica window on the front end. The thin mica window allows the passage and detection of alpha particles. The tube is evacuated and filled with Neon, Argon plus Halogen gas.

Figure 1



It is interesting to see how the GM tube detects radioactivity. A 500 -volt potential is applied to the anode (center electrode) through a ten mega-ohm current limiting resistor. To the cathode of the tube a 460-k ohm resistor is connected.

In the initial state the GM tube has a very high resistance. When a particle passes through the GM tube, it ionizes the gas molecules in its path. This is analogous to the vapor trail left in a cloud chamber by a particle. In the GM tube, the electron liberated from the atom by the radioactive particle and the positive ionized atom both move rap-

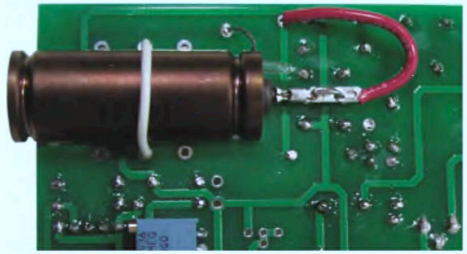


Figure 8

For External Wands

The anode resistor for the GM Tube is housed within the wand. R16 should be jumped with a small piece of wire.

Attach and solder the 8-pin min-din connector to the underside of the PCB as shown in Figure 9 below.

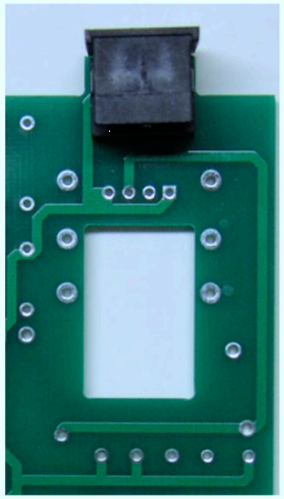
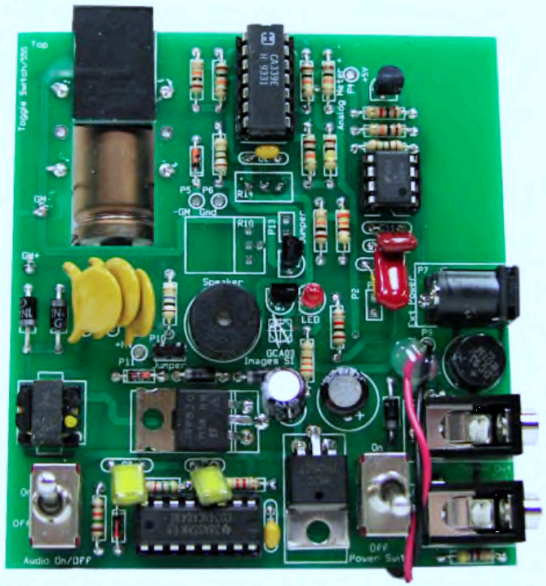


Figure 9

Caution: Plugging or unplugging the GM wand (GCW-01) while the Geiger counter is on may damage the circuit. This damage is not covered under warranty.

Mount and solder the bridge rectifier making sure to align the + terminal of the rectifier to the + terminal on the PCB. At this point your Geiger counter pc board should look like Figure 7 without the GM tube.

Figure 7



Internal Tube

The Geiger Muller tube has two leads. It is mounted on the bottom side of the PCB. The wire connected to the metal sides of the tube is the negative terminal. This is soldered to the (-) GM terminal on the PC board. The center terminal of the GM tube has a removable solder lead. Remove the lead, solder 1.5" of wire to and. Reattach the lead to the center terminal of the GM tube. Take the opposite end of the wire and solder to the (+) GM terminal on the PC board.

The Geiger Mueller tube is delicate and needs to be protected in an enclosure. However the enclosure has a 1/2" hole that allows the front surface (mica window) of the GM tube to remain exposed. This way alpha particles can pass through the thin mica window and be detected.

After securing with a wire, as in Figure 8, a small amount of glue or epoxy can be dabbed on the wire tube assembly for added support.

idly towards the high potential electrodes of the GM tube. In doing so they collide with and ionize other gas atoms. This creates a small conduction path allowing a momentary surge of electric current to pass through the tube.

This momentary pulse of current appears as a small voltage pulse across R2. The halogen gas quenches the ionization and returns the GM tube to its high resistance state making it ready to detect radio-activity.

Count Rate Vs Dose Rate

Each output pulse from the GM tube is a count. The counts per second give an approximation of the strength of the radiation field. Below is the approximate GM tube's response to a cesium-137 source, shown in figure 2.

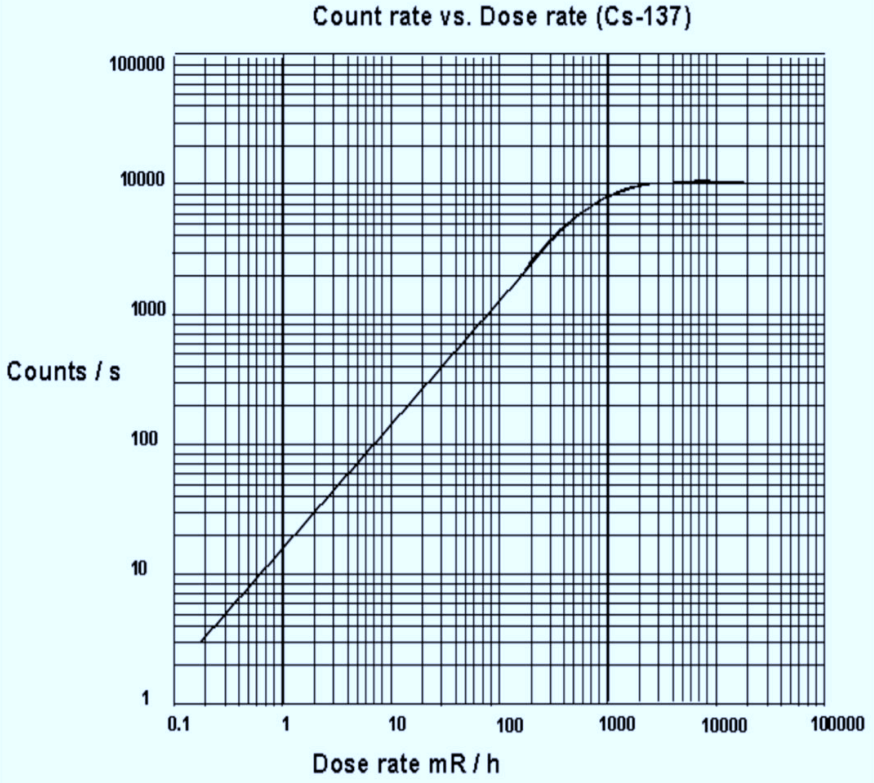


Figure 2

Finding Radioactive Sources

The mantle in some Coleman lanterns are radioactive. Bring your Geiger counter to a local hardware store and check them out.

Uranium ore from a mineral or a rock store should also emit sufficient radiation to trigger the counter.

A more reliable source is to purchase a radioactive source. Small amounts of radioactive materials are available for sale encased in 1 inch diameter by ¼" thick plastic disks. The disks are available to the general public license exempt. This material outputs radiation in the micro-curie range and has been deemed by the Federal government as safe.

The cesium-137 is a good gamma ray source. The cesium 137 has a half-life of 30 years.

Check Out

Turn on the Geiger counter. If you have a radiation source bring the GM tube close to it. The radiation will cause the Geiger counter to start clicking. The LED will pulse with each click. Each click represents the detection of one of the radioactive rays; alpha, beat or gamma.

Background Radiation

Background radiation, from natural sources on earth and cosmic rays will cause the Geiger counter to click. In my corner of the world I have a background radiation that triggers the counter 12-20 times a minute.

Separating & Detecting Beta and Gamma

By placing shields of different materials in front of the GM tube we can filter out some radiation. For instance placing a paper shield in front of the GM tube will block all the Alpha radiation. The Geiger counter will now only detect beta and gamma radiations.
If we place a thin metal shield in front of the GM tube that would effective block the alpha and beta radiation, allowing the detection of gamma radiation.

To check the HV power supply; turn the power switch off. Insert the 9 -volt battery onto the battery cap. Set up a VOM to read 500 to 1000 volts. Place the positive lead of the VOM at P11. The negative lead of the VOM is connected to the—(negative) terminal of the 9-Volt battery.

Apply power to the circuit using the power switch, The circuit should generate anywhere between 550 and 800 volts (depending upon component tolerances) If you are reading between 550 and 800 volts, fine, turn off the power. Add the three zener diodes; D6 (100V) and D7 & D8 (200V). Attach a 2-pin header at P10. Apply power again, with the positive lead of the VOM still attached to P11; you should read a voltage of 500 volts. If you're not getting a proper voltage reading, check the zener diodes to make sure you have them orientated in the right direction.

Continuing Construction

Finish the construction of the circuit by adding the ICS-8 for the 555 timer and the ICS-14 for the LM339. Again, be sure to align the notch on the socket and chips with the silkscreen on the PCB. Mount and solder all remaining resistors; R1 & R4 are 1K resistors (color bands brown, black, red). R2, R5-R8, R12 & R19 are 10K resistors (color bands brown, black, orange). R3 & R11 are 1 Meg resistors (color bands brown, black, green). R13 is a 100K resistor (color bands brown, black, yellow). R15 & R21 are 330 ohm resistors (color bands orange, orange, brown). R16 is a 10 Meg resistor (color bands brown, black, blue), and R20 is a 470 ohm resistor (color bands yellow, purple, brown).

Next mount and solder capacitors C1 & C2 (.1uF), C11 (.047uF) and C12 (.01uf). Mount and solder the 1 Meg, 25-turn potentiometers (R14) on the underside of the board.

Now mount and solder the 5.1V zener diode (D2), the Audio switch, power jack, headphone jack and digital output jack. Mount and solder the speaker, transistors Q1, Q3 & Q4 (2N3904), 2-pin headers (P2) and LED (the longer of the LED terminals is positive (+)) to the PCB. The LED should rise 3/8” from the PCB to the bottom of the LED. This distance will insure proper placement of the LED when the PCB is mounted inside the case.

Place and solder components C8 (.01uf), C9 (.0047uf), C10, (.1uf) and D10 (1N914). Now construct the high voltage section consisting of the step up transformer T2, diodes D4 & D5 (1N4007) and capacitors C3, C4 and C5 (.01uf 1KV). Mount IRF830 transistor Q2 to the PCB, bend the transistor outward so it lays flat on the PCB, see Figure 6, and solder.

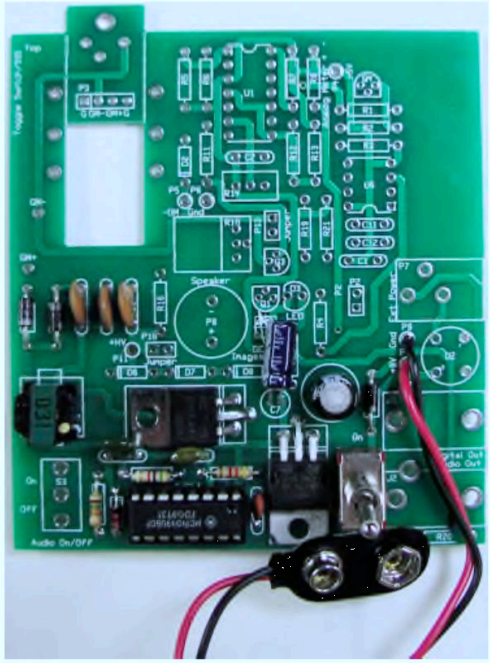


Figure 6

To this add the 5 volt 7805 regulator (U3), bending it outward so it lays flat as with transistor and solder into position. Next mount and solder capacitors C6 (220uf-330uf), C7 (22uf), and diode D9 (1N5817). Place and solder the 9-volt battery cap on the PC board. The red lead connects to the positive terminal P12. The black lead connects to GND, marked P9. Solder the power switch to the PCB at S2. Insert 4049 into the socket, making sure to orient the notch on the chip to the notch on the socket.

Testing HV Section

CAUTION: Circuit generates high voltage power that can provide an electrical shock. Exercise caution when working around the high voltage section of the circuit. The capacitors C4 and C5 can hold a HV charge after the circuit has been shut off.

Features:

GMT Tube

The GCK-01-01 features the GMT-01 (LND 712)

The Geiger-Mueller tube (GMT-01), is Ne + Halogen filled, with a .38" effective diameter 1.5-2.0 mg/cm2 mica end window.

Data Output

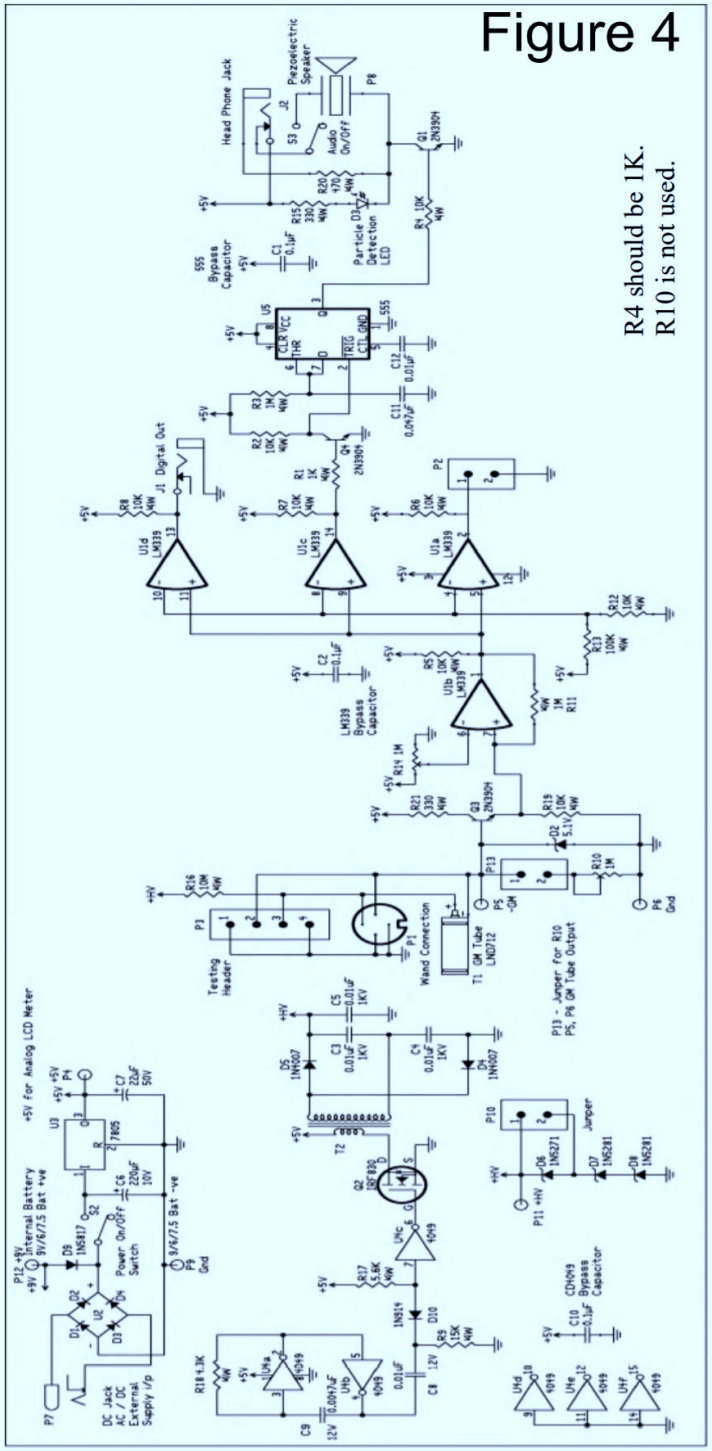
The data output jack may be used for an analog meter. The analog meter is an accessory that plugs into the data output jack and provides a visual indication of the approximate radiation level. The data output provides a TTL logic (+5V) pulse every time the Geiger counter detects radiation. This signal can easily be connected to a microcontroller or PC. The PC or microcontroller can then be used to create a digital Geiger counter, chart recorder or other recording instrument for nuclear experiments.

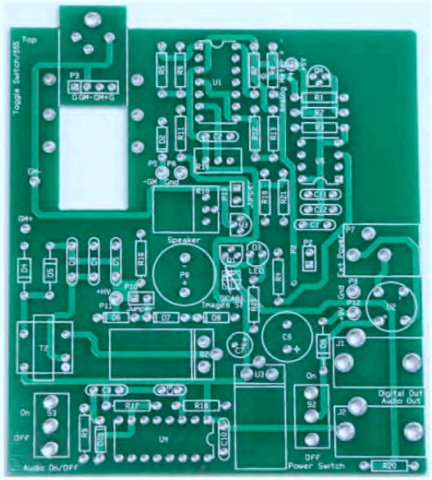
External Power Jack

The GCK-01-01 may be powered by either a 9-Volt battery or external power source with a 2.5mm jack.

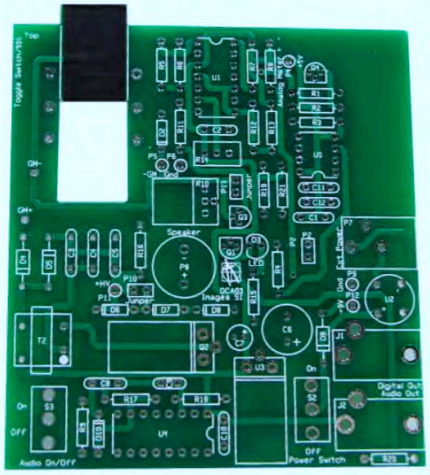
Head Phone Jack

When using the headphone jack for headphones the speaker is automatically cut-off.





5A. PCB for GMT-02 & external wand



5B. PCB for LND712 (GMT-01)

Figure 5

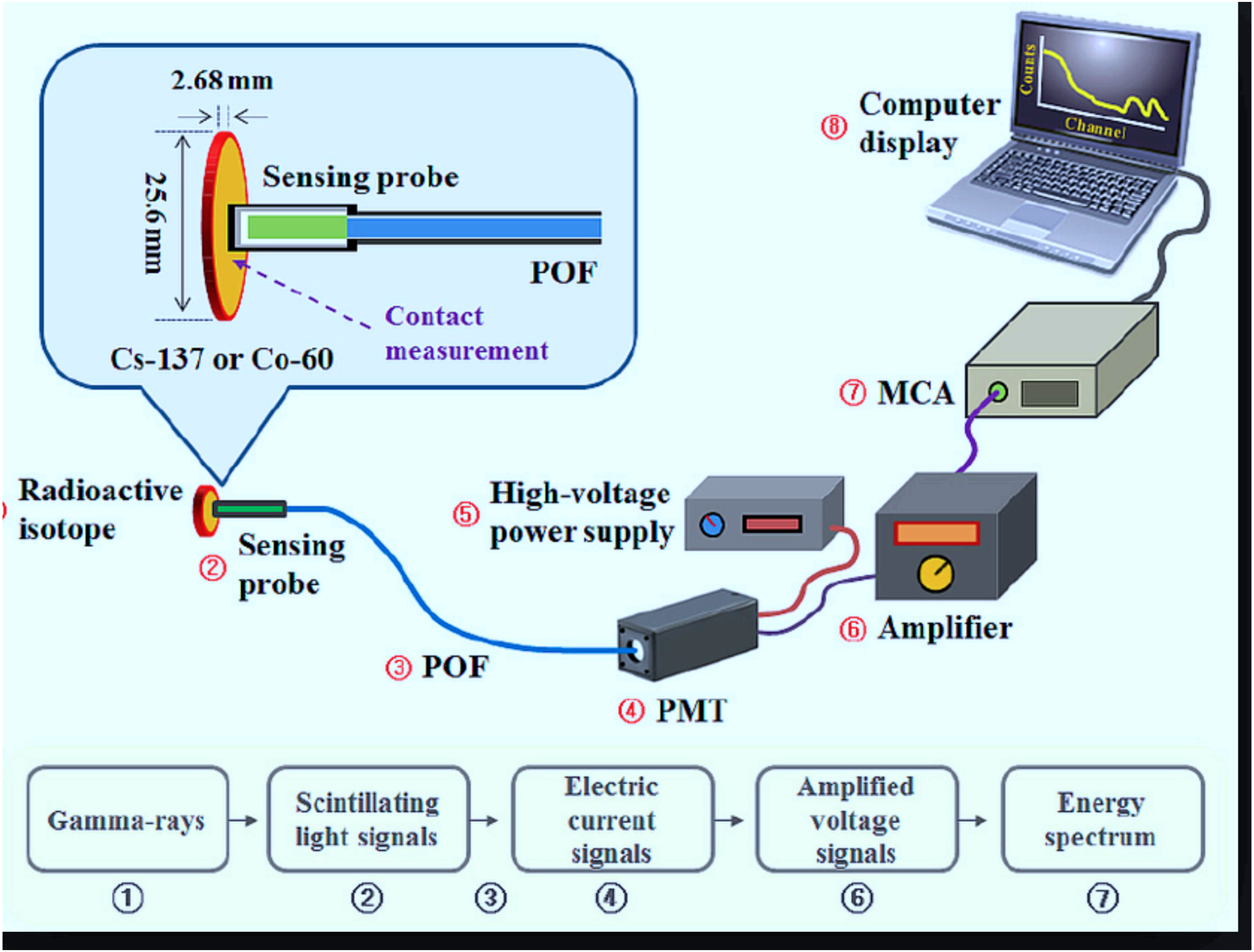
Circuit Construction

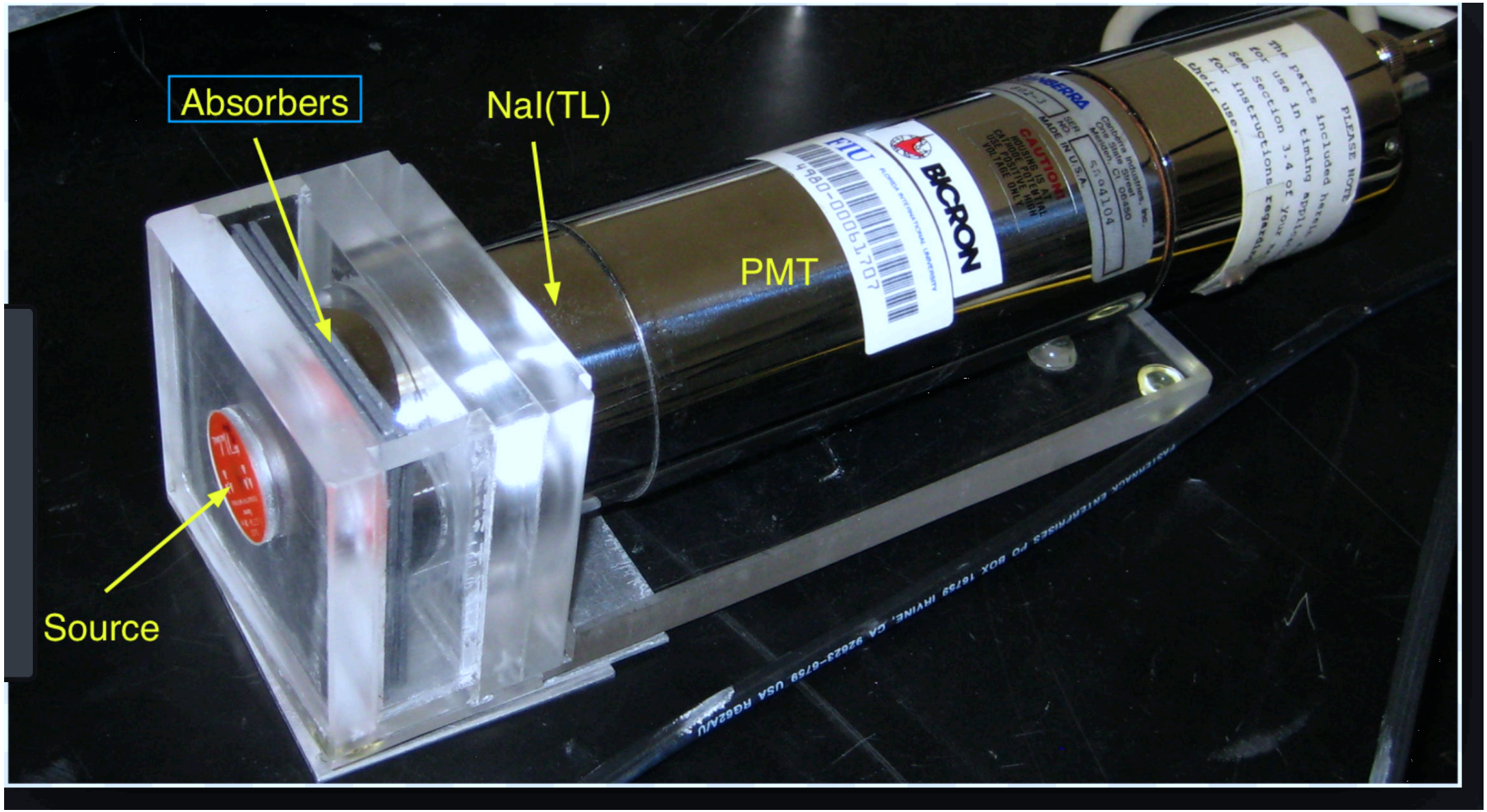
The schematic for the GCK-01-01 is shown in Figure 4. The top silkscreen of the PCB is shown in Figure 5.

Before beginning construction, it is important to decide if you will be using an external wand or attaching the GM tube directly to the PC Board. If you are attached the GM tube directly to the PCB, we must insulate a section of the board to prevent it from shorting out. To do this peel the backing from the included piece of vinyl and wrap and wrap it around the section of the pcb located above the cutout. Begin on the back of the pcb at the top of the opening, wrap it around the top of the pcb and back through the opening. This area is marked with 2 lines on the front of the pcb and shown in black in Figure 5B.

Begin construction by soldering resistors R17 5.6K (color bands green, blue, red), R18 4.3K (color bands yellow, orange, red) and R9 15K (color bands brown, green, orange). Next we will wire the square wave generator and pulse shaping circuit using the ICS-16 socket for the 4049, marked U4 on PCB. Insert the ICS-16, making sure to orient the notch on socket to the drawing on the PCB and solder to the board.

Gamma spectroscopy

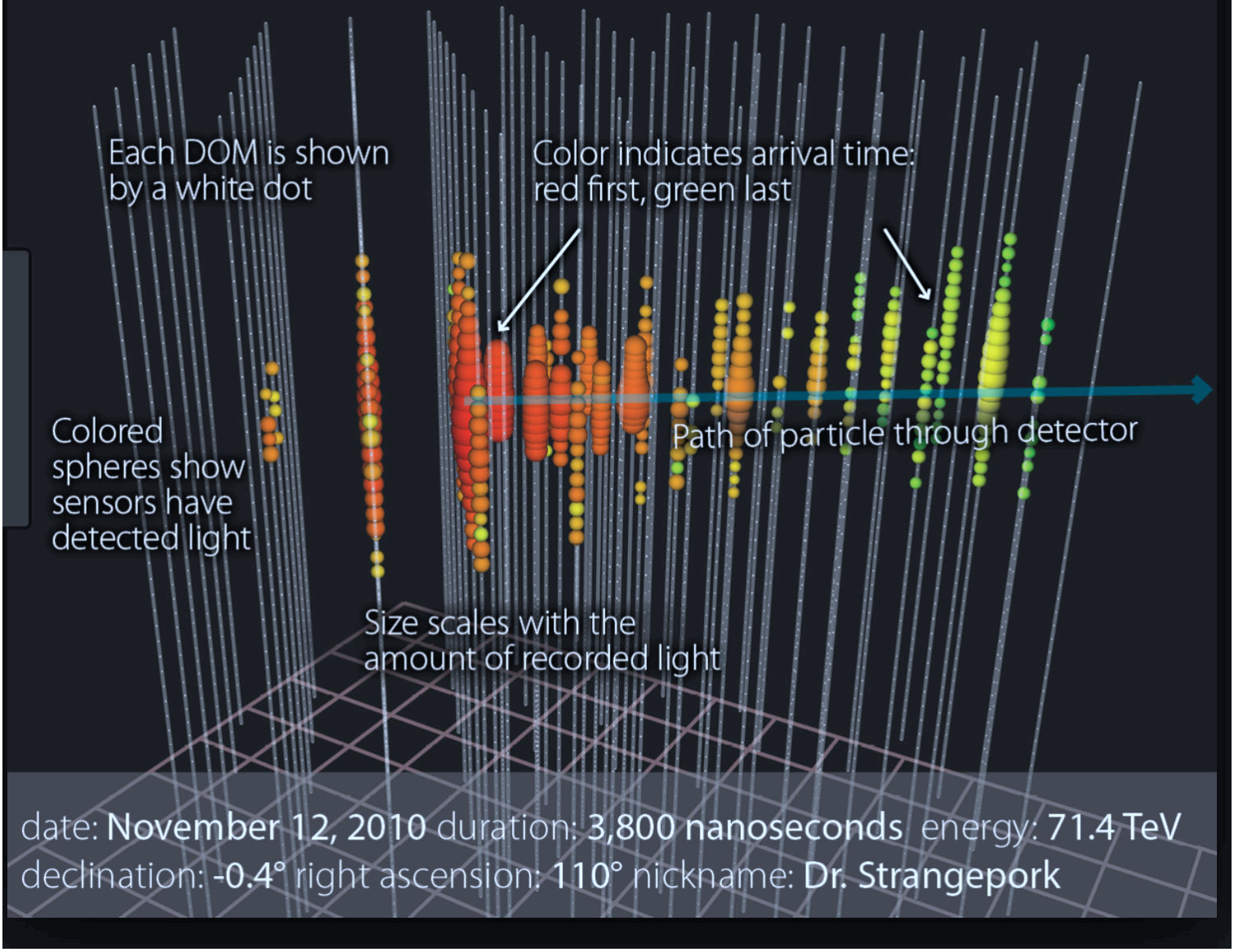

2.68 mm
25.6 mm
Sensing probe
POF
Contact measurement
Cs-137 or Co-60
⑧ Computer display
Counts
Channel
⑦ MCA
⑥ Amplifier
⑤ High-voltage power supply
Radioactive isotope
② Sensing probe
③ POF
④ PMT
Gamma-rays
Scintillating light signals
Electric current signals
Amplified voltage signals
Energy spectrum
①
②
③
④
⑥
⑦


Absorbers
NaI(TL)
PMT
Source
BICRON
FIU

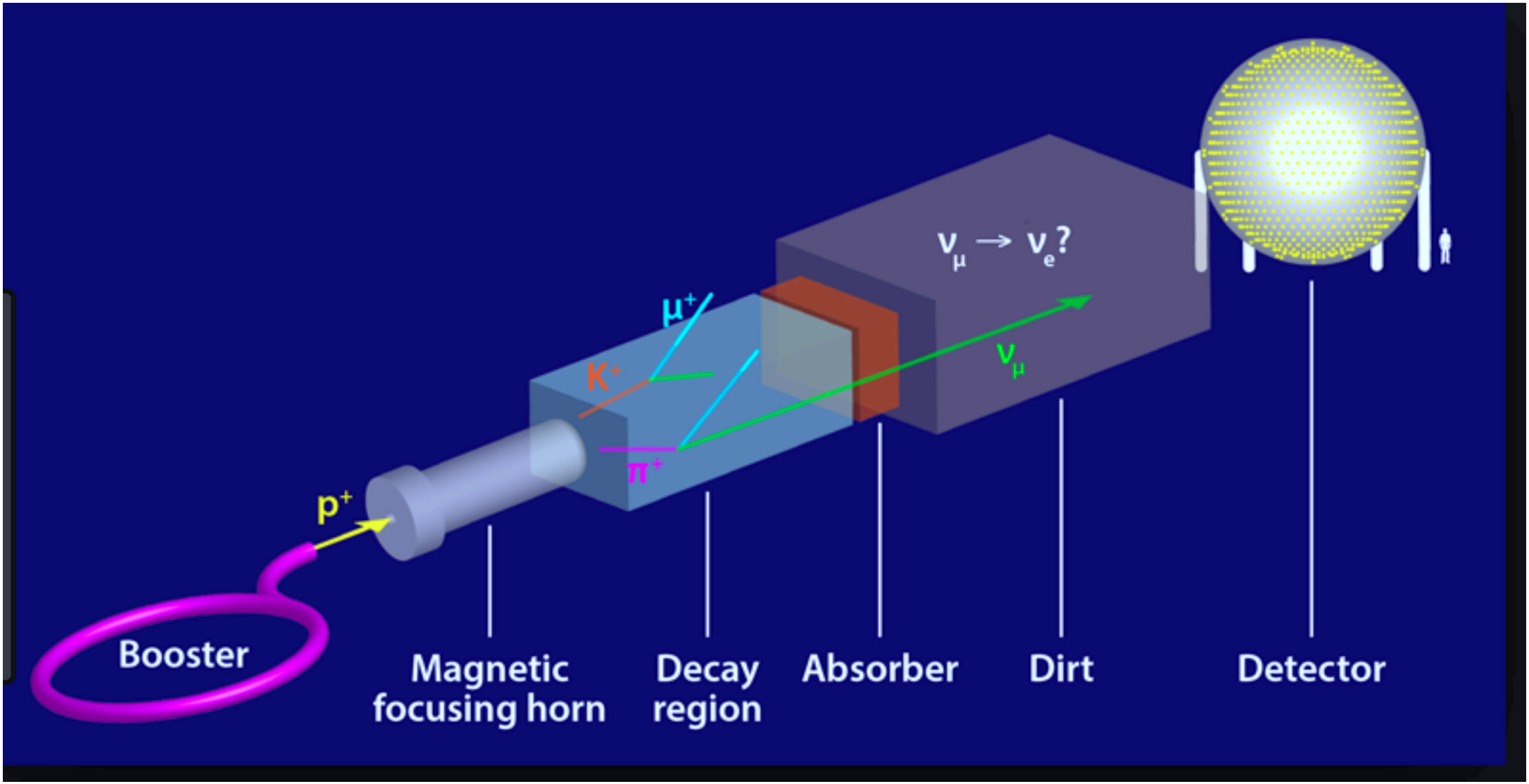
Fermions
Bosons
~2.3 MeV/C²
2/3
1/2
u
UP
~1.275 GeV/C²
2/3
1/2
c
CHARM
~173.07 GeV/C²
2/3
1/2
t
TOP
g
GLUON
~4.8 MeV/C²
-1/3
1/2
d
DOWN
~95 MeV/C²
-1/3
1/2
s
STRANGE
~4.18 GeV/C²
-1/3
1/2
b
BOTTOM
γ
PHOTON
0.511 MeV/C²
-1
1/2
e
ELECTRON
105.7 MeV/C²
-1
1/2
μ
MUON
~1.777 GeV/C²
-1
1/2
τ
TAU
91.2 GeV/
Z
Z BOSON
<2.2 eV/C²
0
1/2
Ve
<0.17 MeV/C²
0
1/2
Vμ
<15.5 MeV/C²
0
1/2
Vτ
80.4 GeV/
W

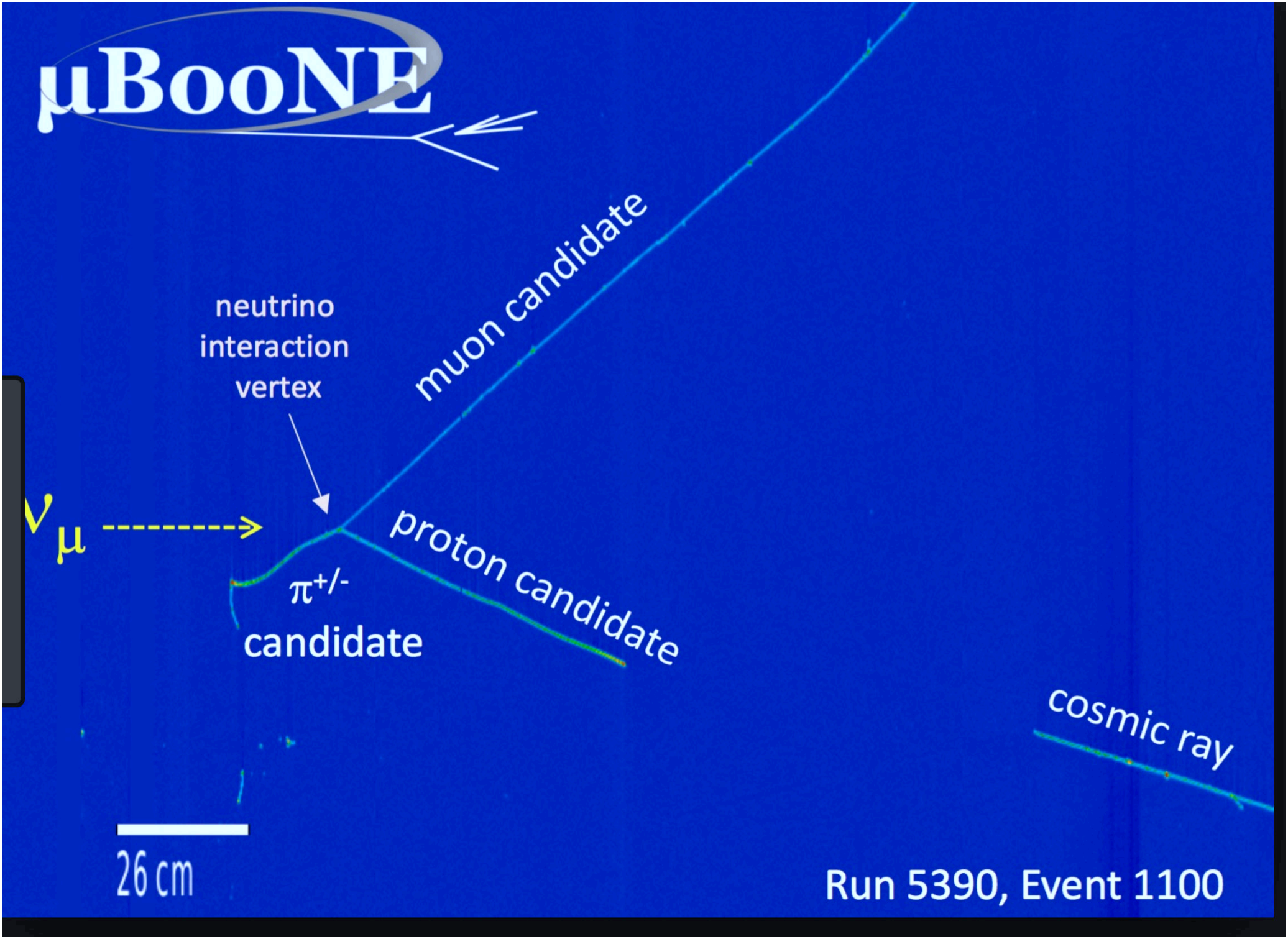
How does IceCube work?

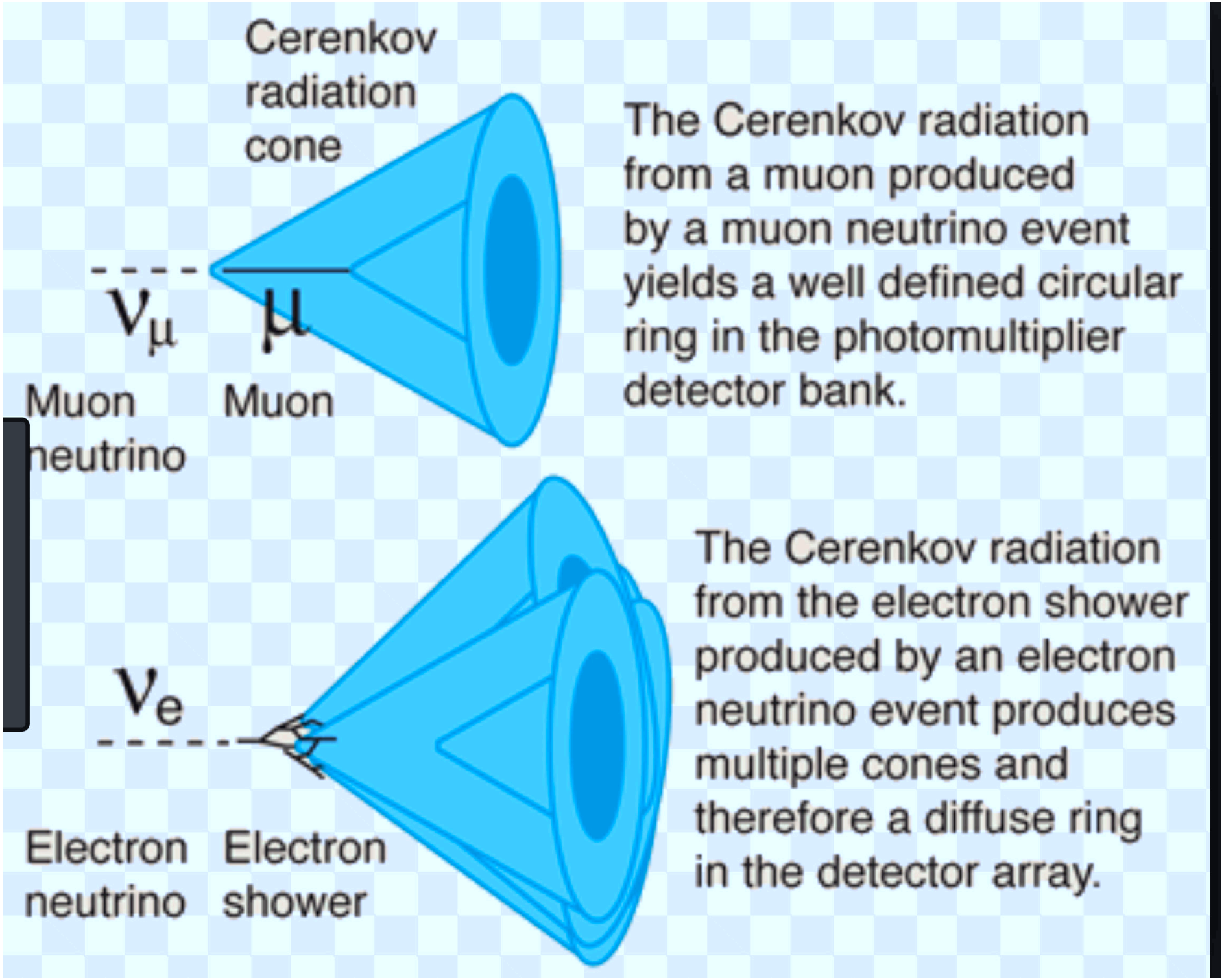
When a neutrino interacts with the Antarctic ice, it creates other particles. In this event graphic, a muon was created that traveled through the detector almost at the speed of light. The pattern and the amount of light recorded by the IceCube sensors indicate the particle's direction and energy.



date: **November 12, 2010** duration: **3,800 nanoseconds** energy: **71.4 TeV**
declination: **-0.4°** right ascension: **110°** nickname: **Dr. Strangepork**


$\nu_\mu \rightarrow \nu_e$?
μ^+
K^+
π^+
p^+
ν_μ
Booster
Magnetic focusing horn
Decay region
Absorber
Dirt
Detector


μBooNE
neutrino
interaction
vertex
muon candidate
ν_μ
proton candidate
$\pi^{+/-}$
candidate
cosmic ray
26 cm
Run 5390, Event 1100

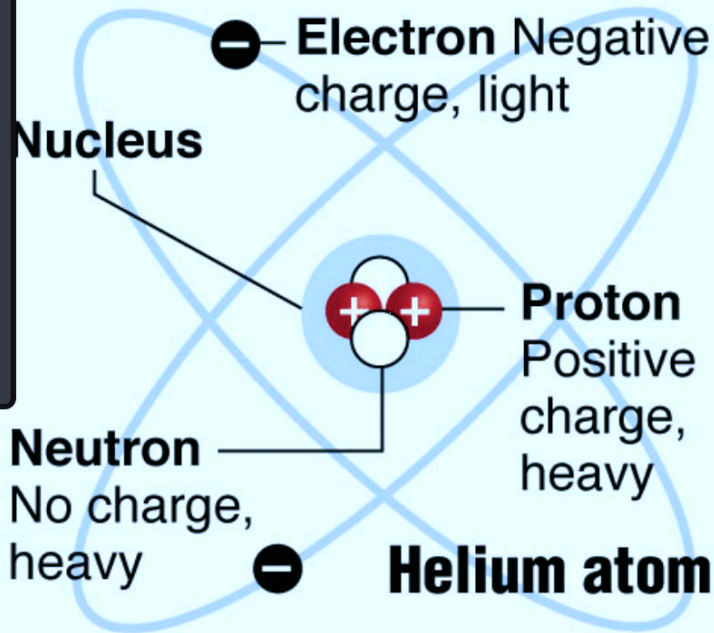

Cerenkov radiation cone
ν_μ
μ
Muon neutrino
Muon
The Cerenkov radiation from a muon produced by a muon neutrino event yields a well defined circular ring in the photomultiplier detector bank.
ν_e
Electron neutrino
Electron shower
The Cerenkov radiation from the electron shower produced by an electron neutrino event produces multiple cones and therefore a diffuse ring in the detector array.

A quirky particle

A new experiment reportedly shows that neutrinos, tiny subatomic particles, travel faster than the speed of light, a finding that would upend Einstein's cornerstone theory of relativity.

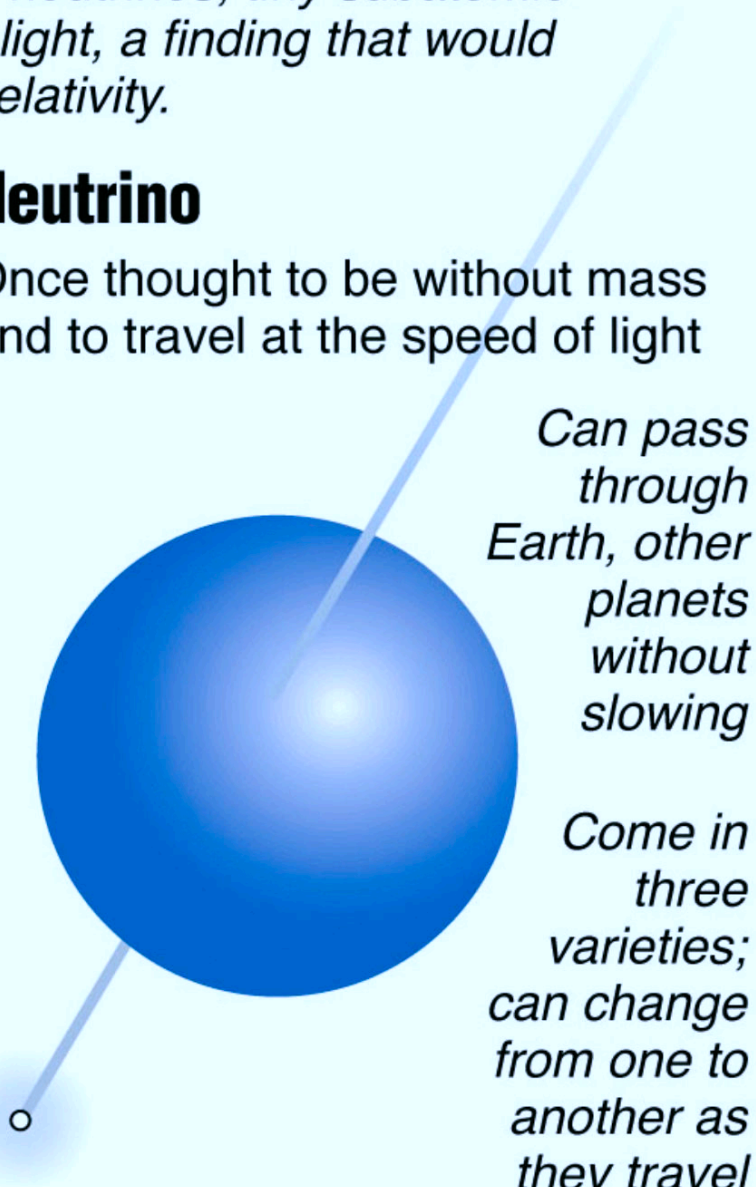
Subatomic particles

- **Neutrino** No charge, 500,000 times lighter than an electron



Neutrino

Once thought to be without mass and to travel at the speed of light



Can pass through Earth, other planets without slowing

Come in three varieties; can change from one to another as they travel

© 2011 MCT

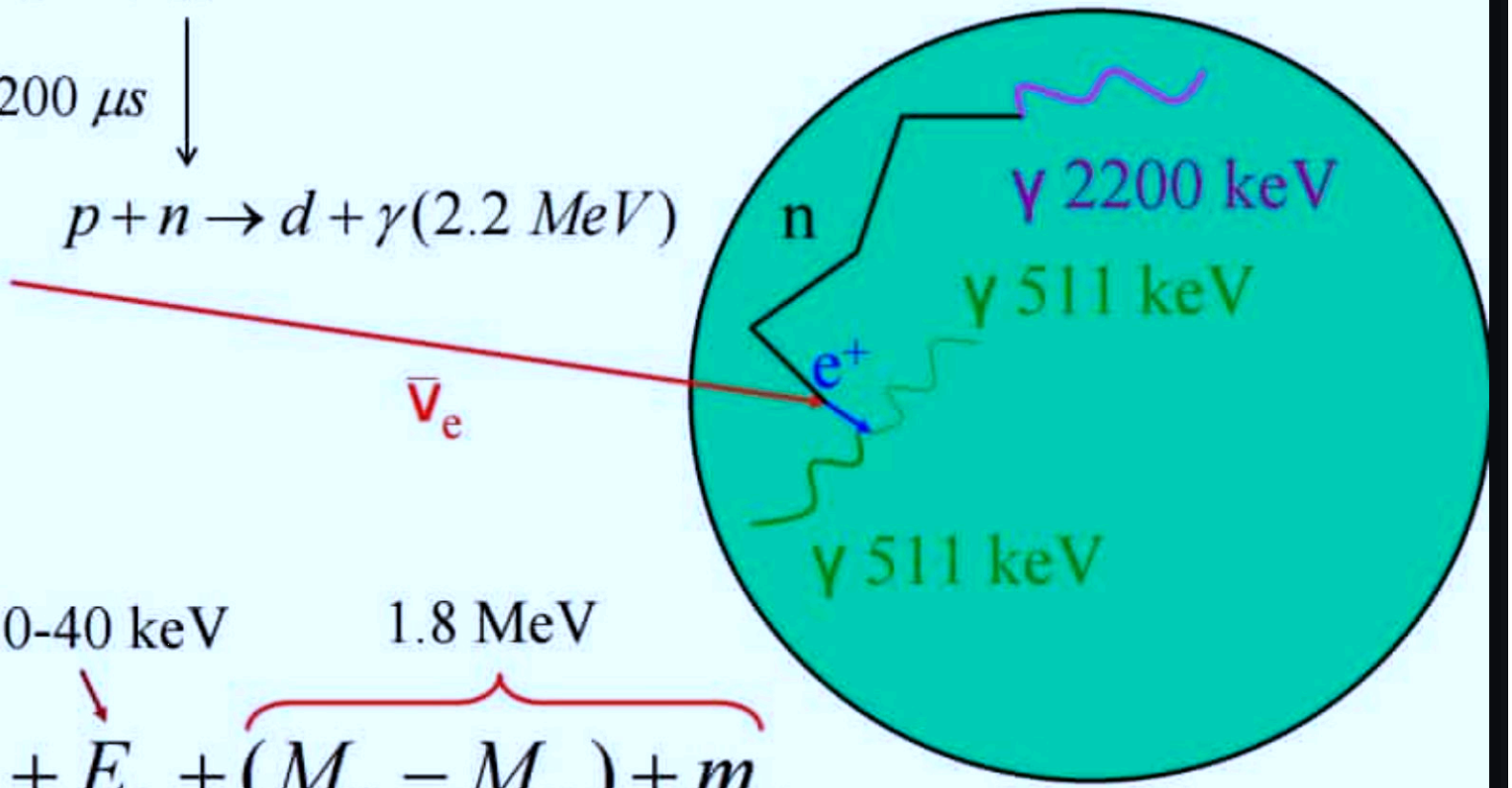
Source: John Learned, University of Hawaii, AP, New York Times

Antineutrino signature: coincidence between prompt e^+ and delayed neutron capture on hydrogen

$$\bar{\nu}_e + p \rightarrow e^+ + n$$

$$\tau \approx 200\ \mu s$$

$$p + n \rightarrow d + \gamma(2.2\ MeV)$$

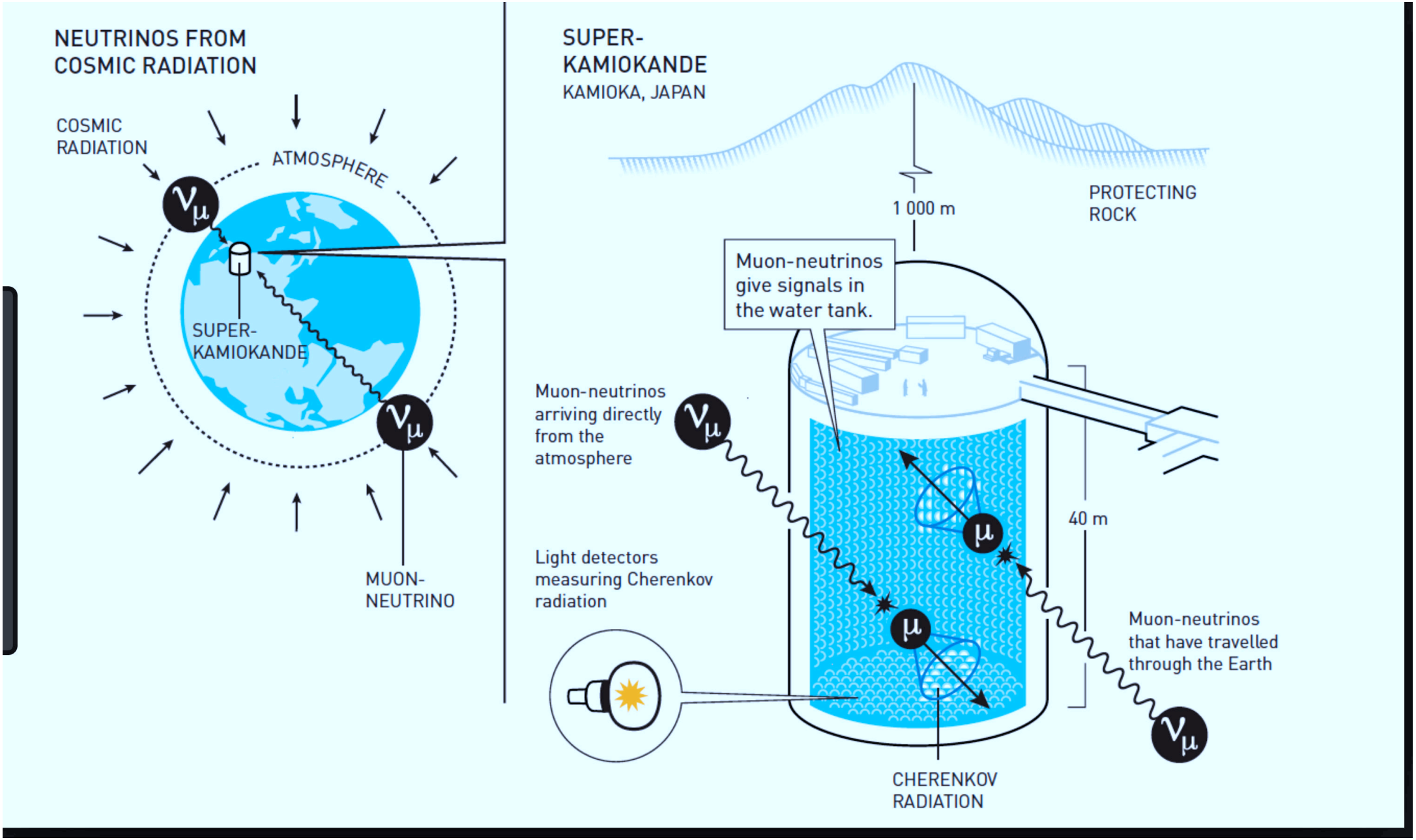


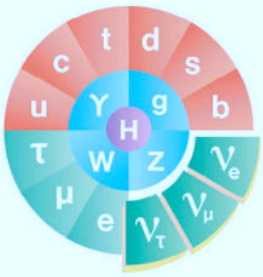
10-40 keV 1.8 MeV

$$E_{\bar{\nu}} \cong E_{e^+} + E_n + (M_n - M_p) + m_{e^+}$$

Including E from e^+ annihilation, $E_{prompt} = E_\nu - 0.8$ MeV

neutrinos do not ionize matter,cant B detected directly. antineutrino detection is based on the inverse beta decay. Detection of Antineutrinos


NEUTRINOS FROM COSMIC RADIATION
COSMIC RADIATION
ATMOSPHERE
SUPER-KAMIOKANDE
MUON-NEUTRINO
SUPER-KAMIOKANDE
KAMIOKA, JAPAN
1 000 m
PROTECTING ROCK
Muon-neutrinos give signals in the water tank.
Muon-neutrinos arriving directly from the atmosphere
Light detectors measuring Cherenkov radiation
40 m
Muon-neutrinos that have travelled through the Earth
CHERENKOV RADIATION

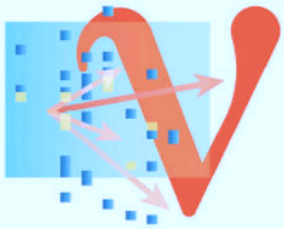


FUNDAMENTAL

Neutrinos are fundamental particles, which means that—like quarks and photons and electrons—they cannot be broken down into any smaller bits.

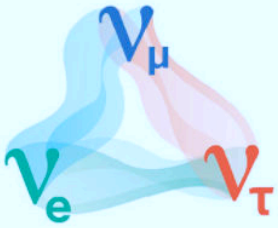
ABUNDANT

Of all particles with mass, neutrinos are the most abundant in nature. They're also some of the least interactive. Roughly a thousand trillion of them pass harmlessly through your body every second.



ELUSIVE

Neutrinos are difficult but not impossible to catch. Scientists have developed many different types of particle detectors to study them.



OSCILLATING

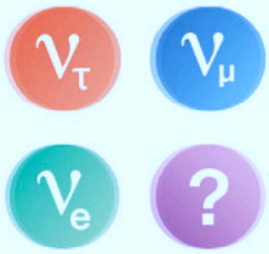
Neutrinos come in three types, called flavors. There are electron neutrinos, muon neutrinos and tau neutrinos. One of the strangest aspects of neutrinos is that they don't pick just one flavor and stick to it. They oscillate between all three.

LIGHTWEIGHT

Neutrinos weigh almost nothing, and they travel close to the speed of light. Neutrino masses are so small that so far no experiment has succeeded in measuring them. The masses of other fundamental particles come from the Higgs field, but neutrinos might get their masses another way.

DIVERSE

Neutrinos are created in many processes in nature. They are produced in the nuclear reactions in the sun, particle decays in the Earth, and the explosions of stars. They are also produced by particle accelerators and in nuclear power plants.



MYSTERIOUS

Neutrinos are mysterious. Experiments seem to hint at the possible existence of a fourth type of neutrino: a sterile neutrino, which would interact even more rarely than the others.

VERY MYSTERIOUS

Scientists also wonder if neutrinos are their own antiparticles. If they are, they could have played a role in the early universe, right after the big bang, when matter came to outnumber antimatter just enough to allow us to exist.

Interested in how the universe works? Read *symmetry*, an online magazine about particle physics and its connections to life and other areas of science. Published by Fermi National Accelerator Laboratory and SLAC National Accelerator Laboratory. symmetrymagazine.org

symmetry | U.S. DEPARTMENT OF ENERGY | Office of Science

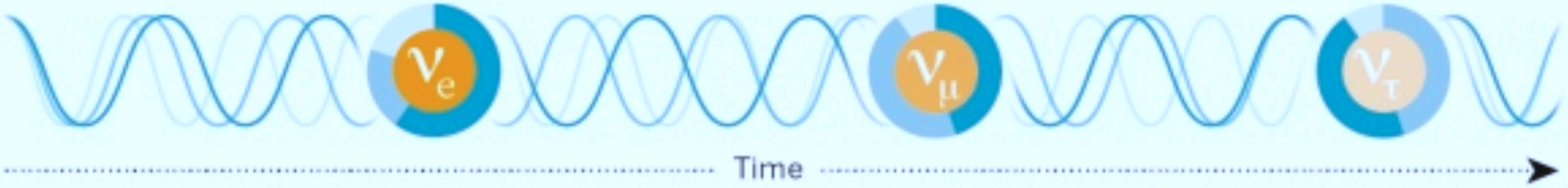
AN UNCONVENTIONAL PARTICLE

A neutrino (ν), or its antimatter counterpart the antineutrino, is always produced alongside an electron (e) or one of the electron's heavier cousins, the muon (μ) or tau (τ) particle — and the presence of this partner particle gives the neutrino a 'flavour'.

Flavours

Unlike electrons, muons and tau particles, neutrinos do not have definite masses. Instead, every neutrino is a mixture — or quantum superposition — of three 'mass states', and those states mix in different proportions to make different flavours.

Mass states



As a neutrino travels, each state contributes to its mass at a varying rate, causing the neutrino to change flavour over time. The frequency of the changes depends on the differences between the mass states, the neutrino's energy and parameters that govern how the states are allowed to mix.

© nature

Topological signature in the NEXT high pressure xenon TPC

Paola Ferrario, Instituto de Física Corpuscular (Universitat de València-CSIC)

on behalf of the NEXT Collaboration

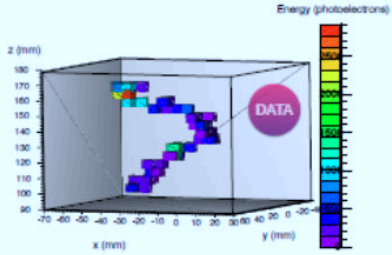
THE NEXT EXPERIMENT

NEXT is an experiment looking for neutrinoless double beta decay in a high pressure xenon TPC. It is located at the Canfranc Underground Laboratory (LSC), in the Spanish Pyrenees. It uses electroluminescence (EL) for energy measurement and tracking and has proven an excellent energy resolution (~0.74% FWHM extrapolated to the $Q_{\beta\beta}$ of Xe-136, i.e., 2.458 MeV) and topological signature for background rejection in prototypes. A first stage, NEW, with ~10 kg of xenon, is being commissioned at the LSC — see poster P4.066 for more details.

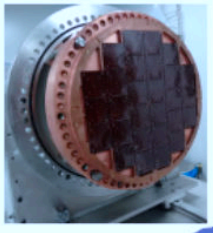
BACKGROUND IN NEXT

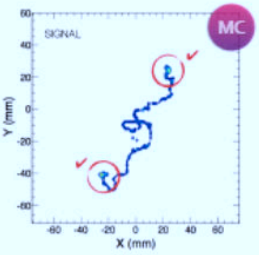
The main background in NEXT comes from high energy gammas from environmental radioactivity entering the active volume of the detector. When gammas interact with xenon gas, they can produce photoelectric and Compton electrons, at energies very similar to $Q_{\beta\beta}$. Electrons and muons coming from outside can be efficiently vetoed with fiducial cuts . See poster P4.065 for more details.

TRACK RECONSTRUCTION



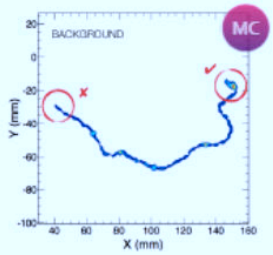
The current track reconstruction is based on the analysis of the charge detected in each time bin by an array of silicon photomultipliers placed behind the EL area. A search for 2D hits and a subsequent voxelization of the whole space is performed, and a Breadth First Search (BFS) algorithm is used to connect the voxels to form tracks. The algorithm sorts the voxels into tracks with a criterium of connectivity, which considers two voxels as connected if their centres are closer than a maximum distance. The algorithm also finds the end-points of a track as the voxels with maximum distance along the track.





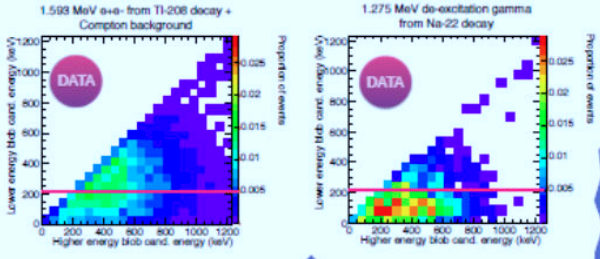
THE TOPOLOGICAL SIGNATURE

Electrons moving through xenon gas lose energy at an approximately fixed rate until they become non-relativistic. At the end of the trajectory they produce an energy 'blob', i.e., a high energy deposition in a small region. This feature can be used to distinguish background single-electrons (one 'blob' only) from signal double-electrons (two 'blobs').



PROOF IN NEXT-DEMO

NEXT-DEMO was a 1-kg prototype, built and operated at IFIC, Valencia. We have demonstrated the power of topological cut using radioactive sources: Na-22 provides high energy electrons and Th-228 electron-positron pair production, to mimic background and signal respectively. A minimum threshold was imposed on the energy deposited at both ends of one track to pass the filter. A signal efficiency of 66.7% ± 0.9% and a background acceptance of 24.3% ± 1.3% is found, in good agreement with MC simulations.



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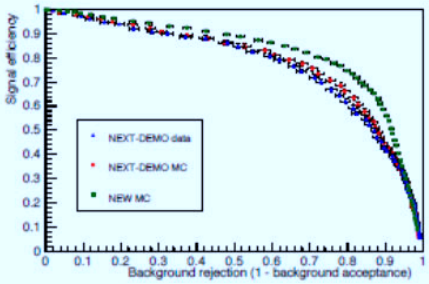
EXPECTED PERFORMANCE IN NEW

NEW will be used for background and two-neutrino double beta decay measurements, as well as to prove energy resolution and the power of topological rejection at energies close to $Q_{\beta\beta}$. Simulations indicate a significant improvement of the topological rejection, due to the larger volume of the detector. First MC studies point to 66.9% ± 0.6% signal efficiency for 12.9% ± 0.6% background acceptance for the same analysis as in NEXT-DEMO at a pressure of 10 bar.



FUTURE IMPROVEMENTS

New reconstruction approaches are being investigated. The Maximum Likelihood Expectation Minimization method tries to solve the inverse problem of finding a set of energy depositions in the chamber, given the sensors response to the EL light. Given a statistical model that describes the forward problem, it provides estimates for the model's parameters, maximizing the likelihood of the model, given any outcome. We are also exploring the power of deep neural networks, which could be used for reconstruction and classification of events as signal or background, exploiting all possible features in the image.

NEUTRINO 2016 — XXVII INTERNATIONAL CONFERENCE ON NEUTRINO PHYSICS AND ASTROPHYSICS — 4 - 9 JULY 2016

This work was supported by the following agencies and institutions: the European Research Council (ERC) under the Advanced Grant 339787-NEXT; the Ministerio de Economía y Competitividad of Spain under grants CONSOLIDER-Ingenio 2010 CSD2008-0037 (CUP), FIS2014-53371-C04 and the Severo Ochoa Program SEV-2014-0398.

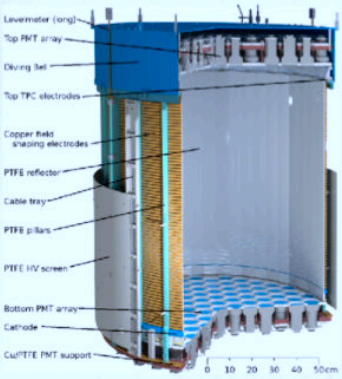
A Search for ^{124}Xe Double Electron Capture with XENON1T

Alexander Fieguth and Christian Wittweg
on behalf of the XENON collaboration

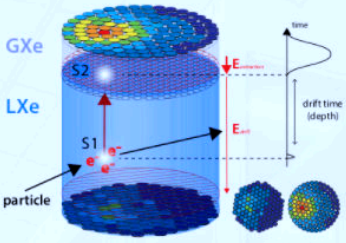
a.fieguth@wwu.de
c.wittweg@wwu.de

WWU MÜNSTER

XENON1T

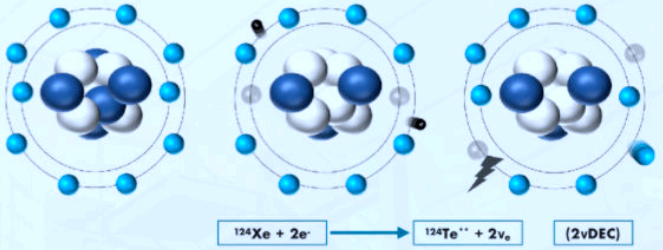


- Dual-phase liquid xenon time projection (LXe TPC) located at 3600 m.w.e in Hall B of LNGS.
- In total ~3200 kg of LXe with about 2000 kg actively monitored by 248 PMTs.
- Embedded in a 9.6 m diameter and 10 m height water shield acting as an active muon veto.



- **Full 3D position** reconstruction allows for fiducialisation of the target volume.
- **Lowest background rate** achieved for a dark matter search experiment with a rate between 50 -100 keV of **~ 2 x 10^{-4} events / (kg x keV x d)** in 1 ton inner volume.
- Energy reconstruction in two-dimensional space via light and charge signals.

Double Electron Capture



^{124}Xe + 2e$^-$ → ^{124}Te** + 2ν_e (2νDEC)

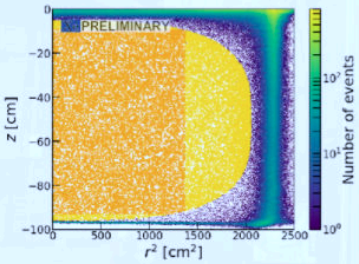
Nuclear matrix element (NME)
Large uncertainty and discrepancy between models. **Detection of decay will shed light on calculations.**

$$T_{\frac{1}{2}}(2\nu) \sim a_{2\nu} F_{2\nu} |(M_{2\nu})|^2$$

Dimensional factor - yr^{-1} | **Phase-space factor - Q^5**

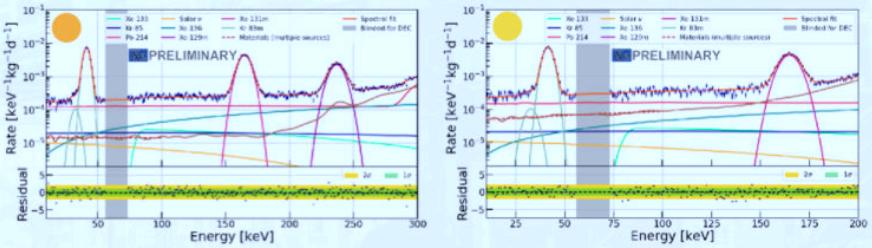
- ^{124}Xe is predicted to decay via **double electron capture** (DEC) into ^{124}Te.
- Q-Value of 2857 keV allows other decay modes involving positrons as well.
- Neutrinos escape the detector, which makes the only detectable signal the relaxation quanta from the filling process of the holes of ^{124}Te.
- Single quanta are not resolvable, so the expected signal is a line at **64.33 keV**.
- Predicted half-life (10^{21} –10^{23} yr) experimentally accessible, but **no direct observation** yet.

Fiducial Volume



- Optimized using background data at ~ 100 keV by iteratively testing **m / events$^{1/2}$** for different volumes.
- 1500 kg LXe with an isotopic fraction of (9.94 ± 0.21) x 10^{-4} amounts to **1.4 kg ^{124}Xe** and an exposure of **~ 1 ton x year**.
- Segmented into 1000 kg inner and 500 kg outer volume for background matching

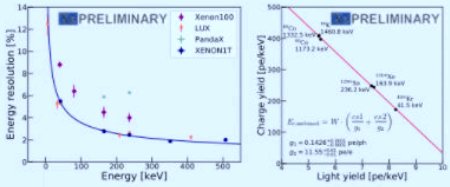
Background Model



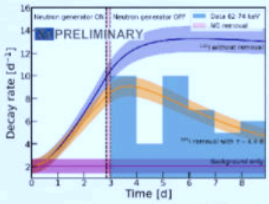
- **XENON1T Monte Carlo simulation** includes physical processes from Geant4 as well as detector response.
- MC spectra matched to measured data using a **χ^2-minimisation** with Lagrangian multipliers.
- Uses information from material screening during construction, Xe-136 isotopic abundance measured in situ and Kr-85 concentration from RGMS for parameter constraints.
- **Segmentation** of the fiducial volume paired with **combined fit** allows to disentangle homogeneous intrinsic and inhomogeneous external backgrounds.

Energy Resolution

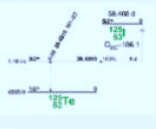
- Energy calibration using anti-correlation of light and charge signal for mono-energetic lines from calibration sources and background isotopes.
- Energy resolution determined from Gaussian fits to peaks in the reconstructed energy spectrum.
- Use of dual signal reduces recombination fluctuations and allows energy resolution of **4.1 % (2.64 keV)** at DEC energy.



^{125}I Background



$$^{124}\mathrm{Xe} + \mathrm{n} \rightarrow {}^{125}\mathrm{Xe} + \gamma$$
$$^{125}\mathrm{Xe} + \mathrm{e} \xrightarrow{16.8\,\mathrm{h}} {}^{125}\mathrm{I} + \nu_e$$



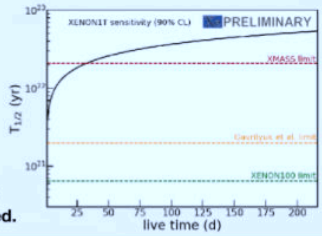
- **^{125}Xe** activated by thermal neutrons from calibrations decays to ^{125}I with $T_{1/2}$ = 16.8 h.
- Radiogenic thermal neutrons suppressed by water shield. Activation only in purification loop.
- **67.5 keV** signal from ^{125}I decays with **$T_{1/2}$ = 59.4 d**.
- **Fast iodine removal** verified in activation studies with ^{241}AmBe and a DD-fusion neutron generator.

$$\frac{dN_\mathrm{I}}{dt} = \lambda_\mathrm{Xe} N_\mathrm{Xe}(t) - (\lambda_\mathrm{I} + \lambda_\mathrm{pur}) N_\mathrm{I}(t)$$

^{125}I background strongly constrained and mitigated.

Sensitivity Study

- Best limit on the half-life from the XMASS experiment with $T_{1/2} > 2.1 \times 10^{22}$ yr at 90% C.L.
- 216.7 days live time from the newest science run available
- High acceptance (>93%) in the signal region
- Well understood dataset from the world's most sensitive WIMP dark matter search
- Estimated sensitivity for the data set **$T_{1/2} > 5.4 \times 10^{22}$ yr**



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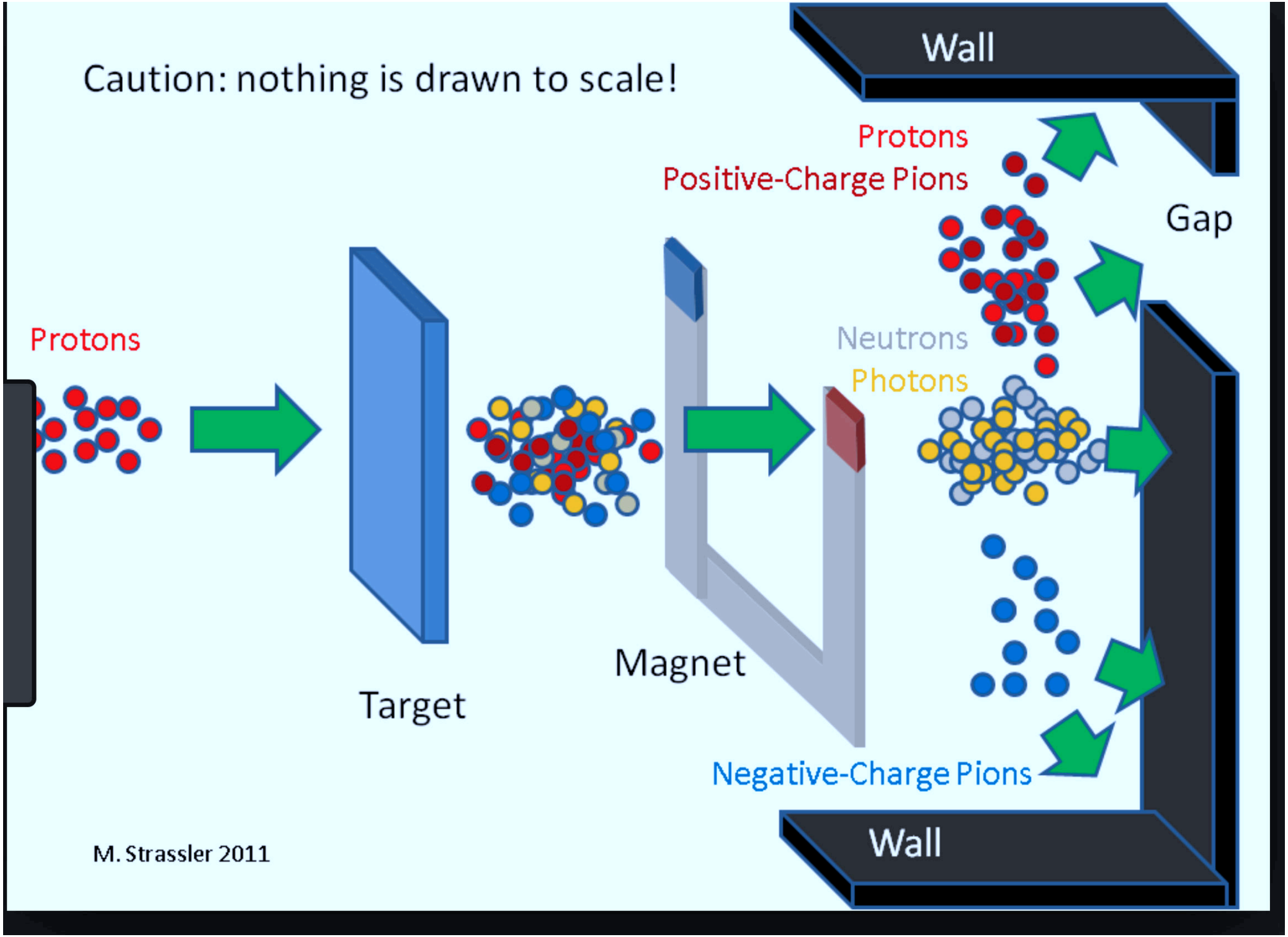
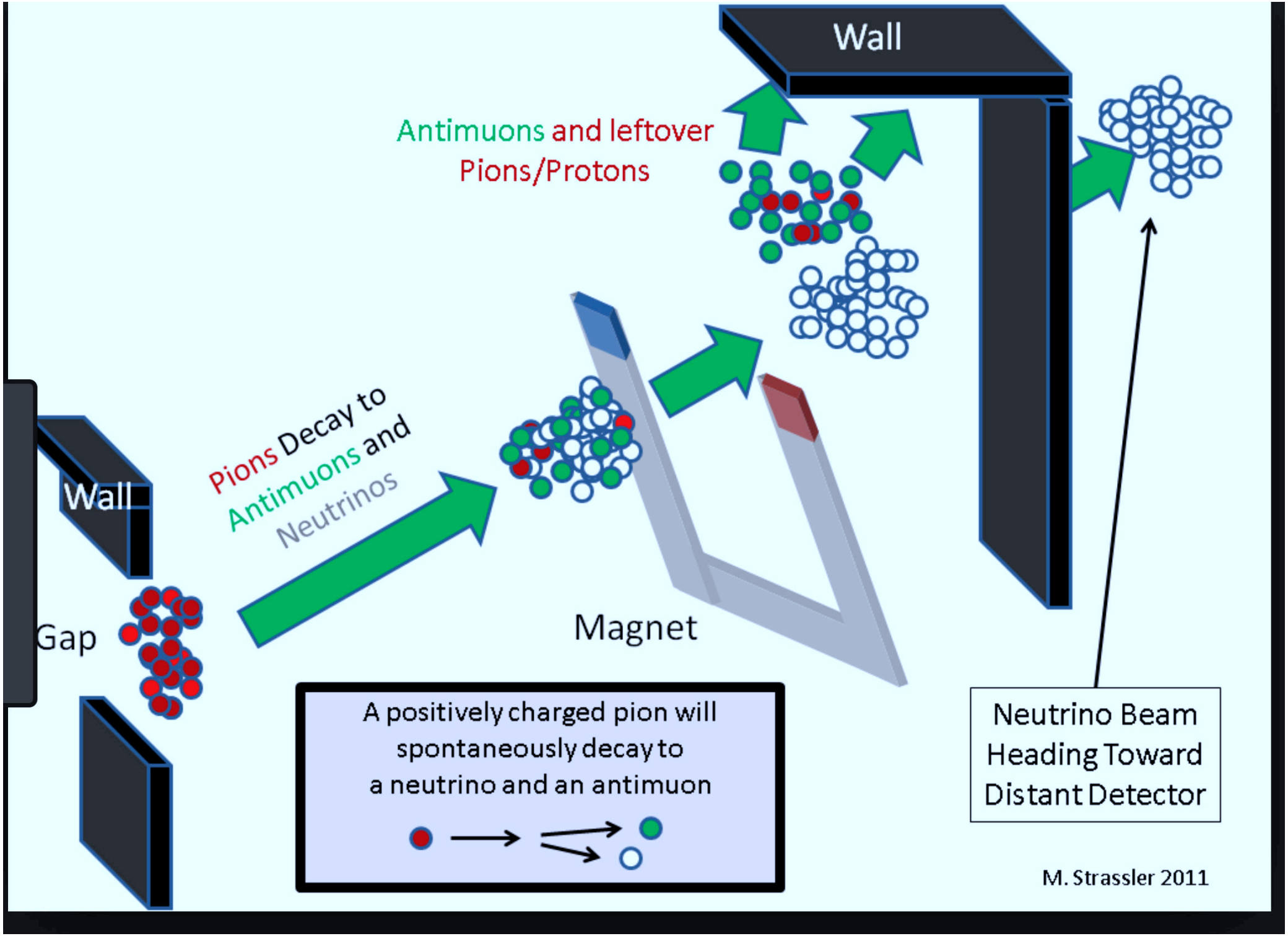
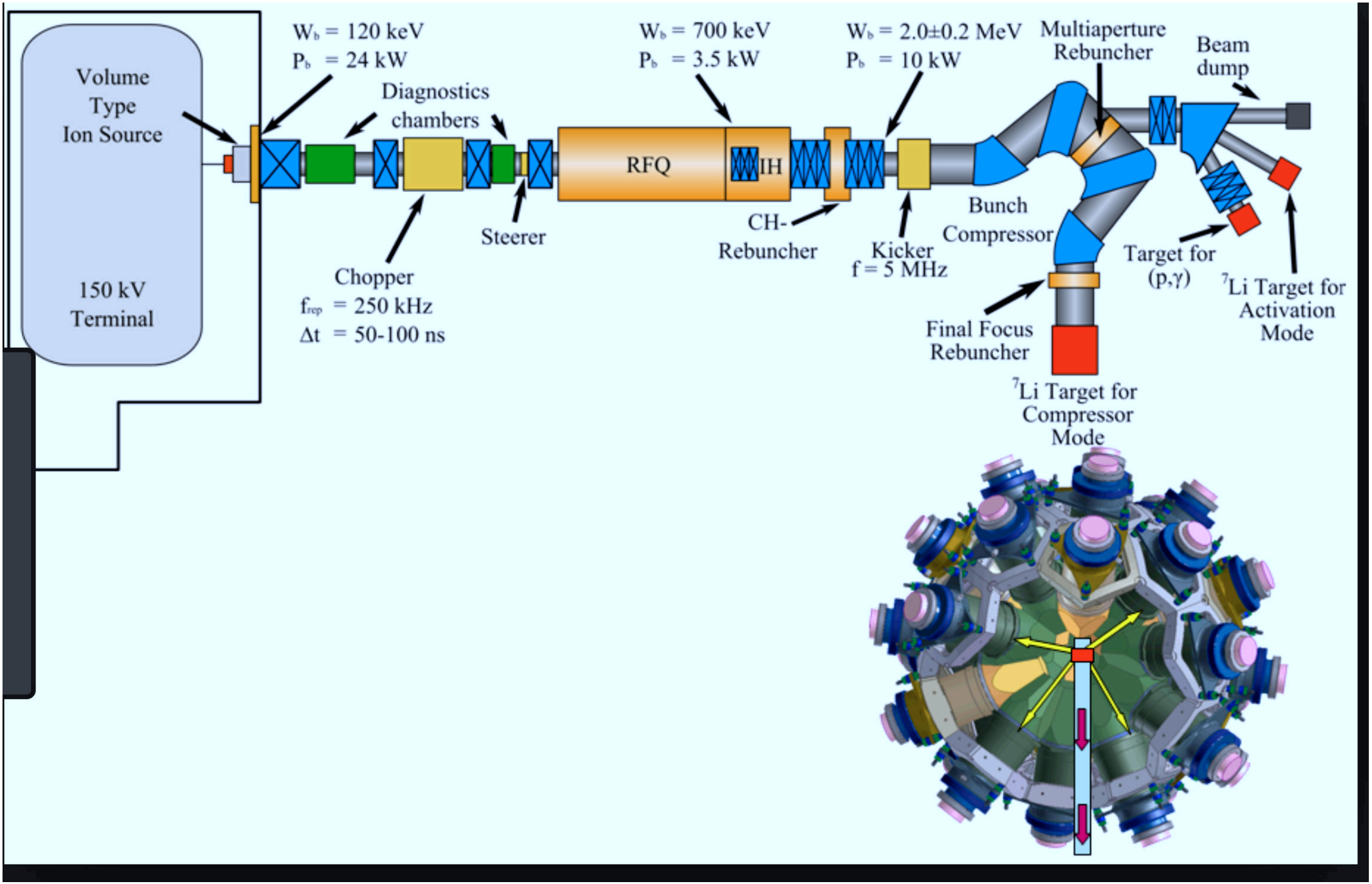
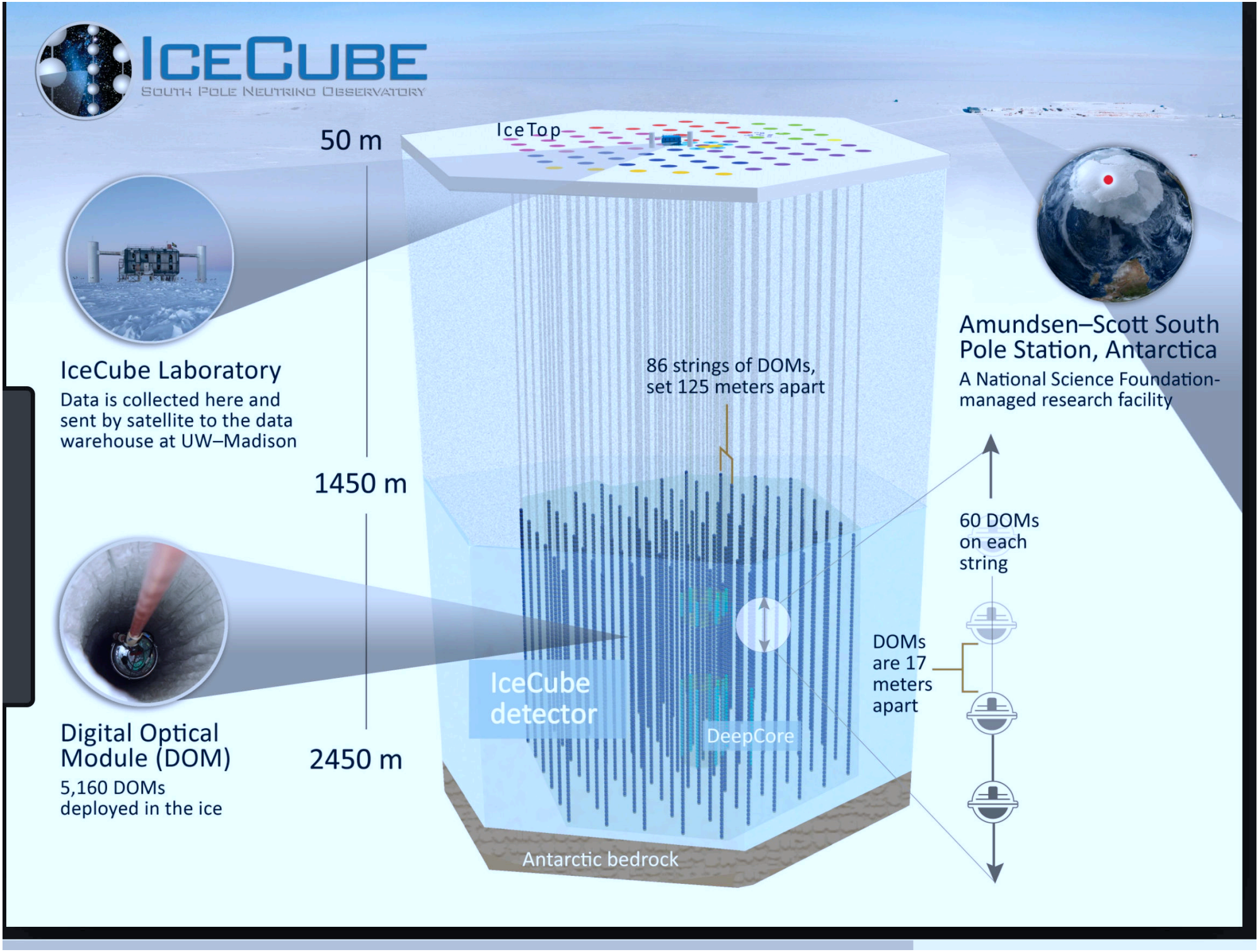
This work is supported by BMBF under contract number 05A14PM1 XENON Project and DFG GRK 2149.

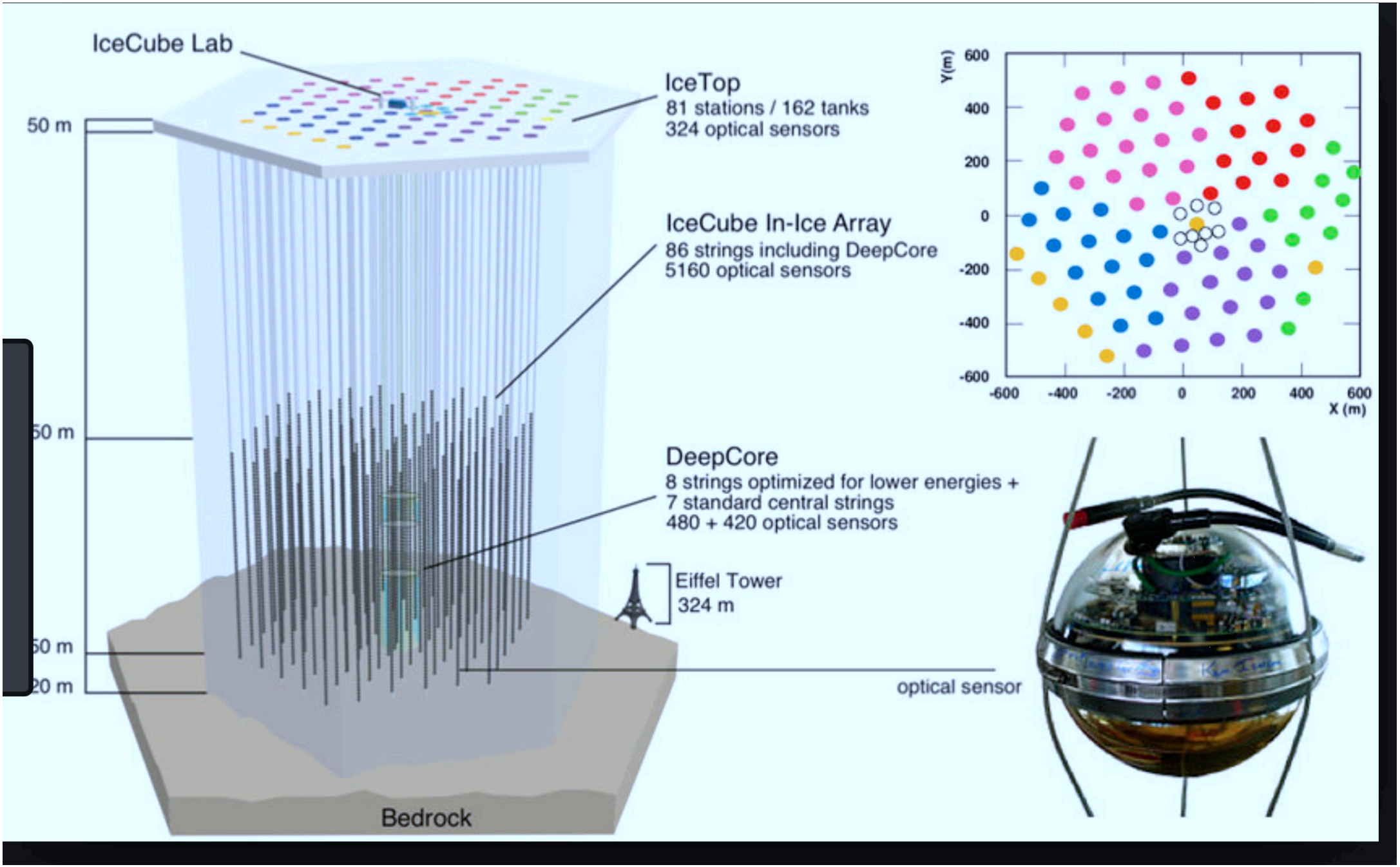
GRK 2149


Caution: nothing is drawn to scale!
Wall
Protons
Positive-Charge Pions
Gap
Protons
Neutrons
Photons
Target
Magnet
Negative-Charge Pions
Wall
M. Strassler 2011

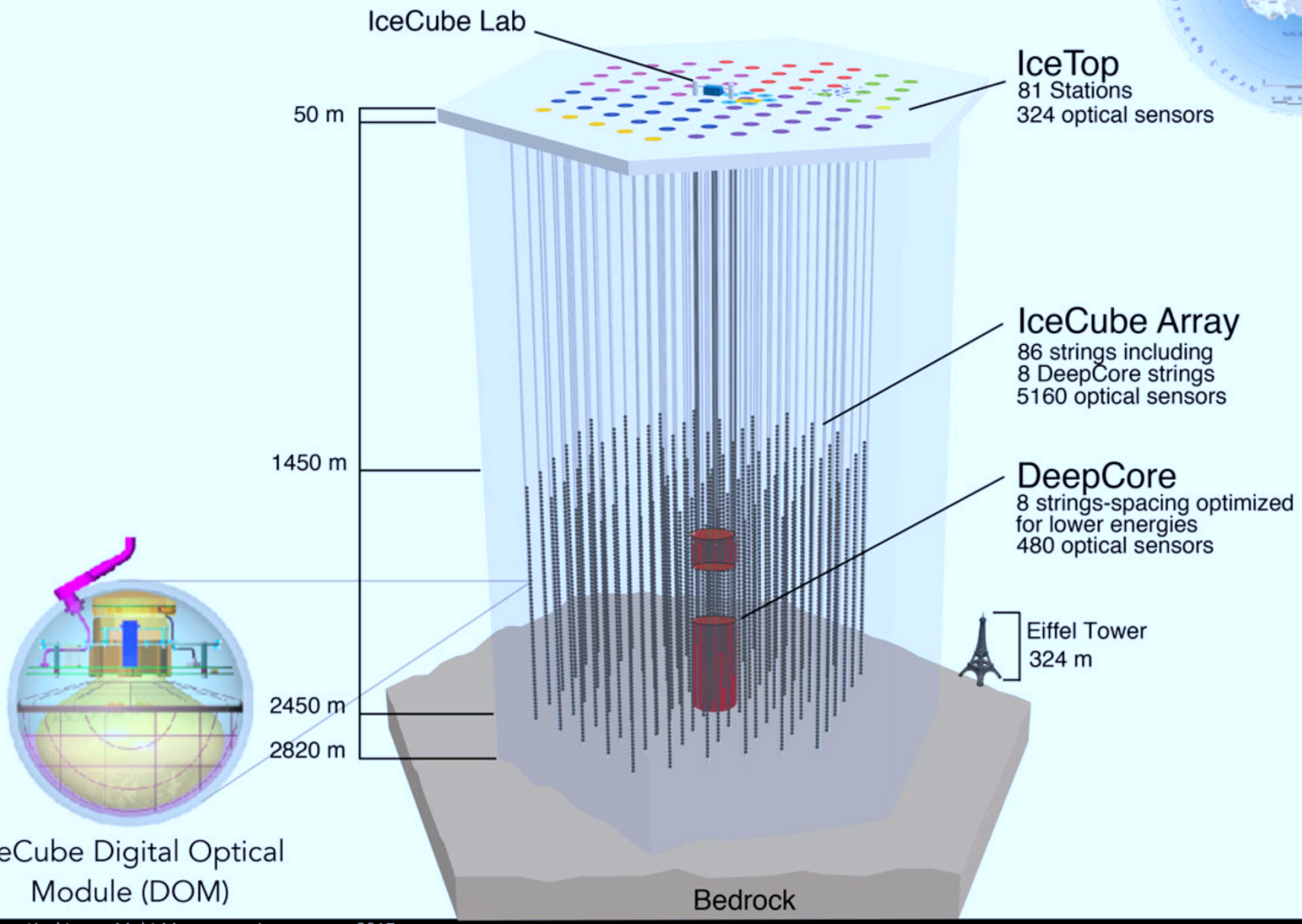

Wall
Antimuons and leftover
Pions/Protons
Wall
Pions Decay to
Antimuons and
Neutrinos
Gap
Magnet
A positively charged pion will
spontaneously decay to
a neutrino and an antimuon
Neutrino Beam
Heading Toward
Distant Detector
M. Strassler 2011


Volume
Type
Ion Source
150 kV
Terminal
W_b = 120 keV
P_b = 24 kW
Diagnostics
chambers
Chopper
f_{rep} = 250 kHz
Δt = 50-100 ns
Steerer
RFQ
IH
W_b = 700 keV
P_b = 3.5 kW
CH-
Rebuncher
W_b = 2.0±0.2 MeV
P_b = 10 kW
Kicker
f = 5 MHz
Multiaperture
Rebuncher
Bunch
Compressor
Beam
dump
Target for
(p,γ)
^{7}Li Target for
Activation
Mode
Final Focus
Rebuncher
^{7}Li Target for
Compressor
Mode

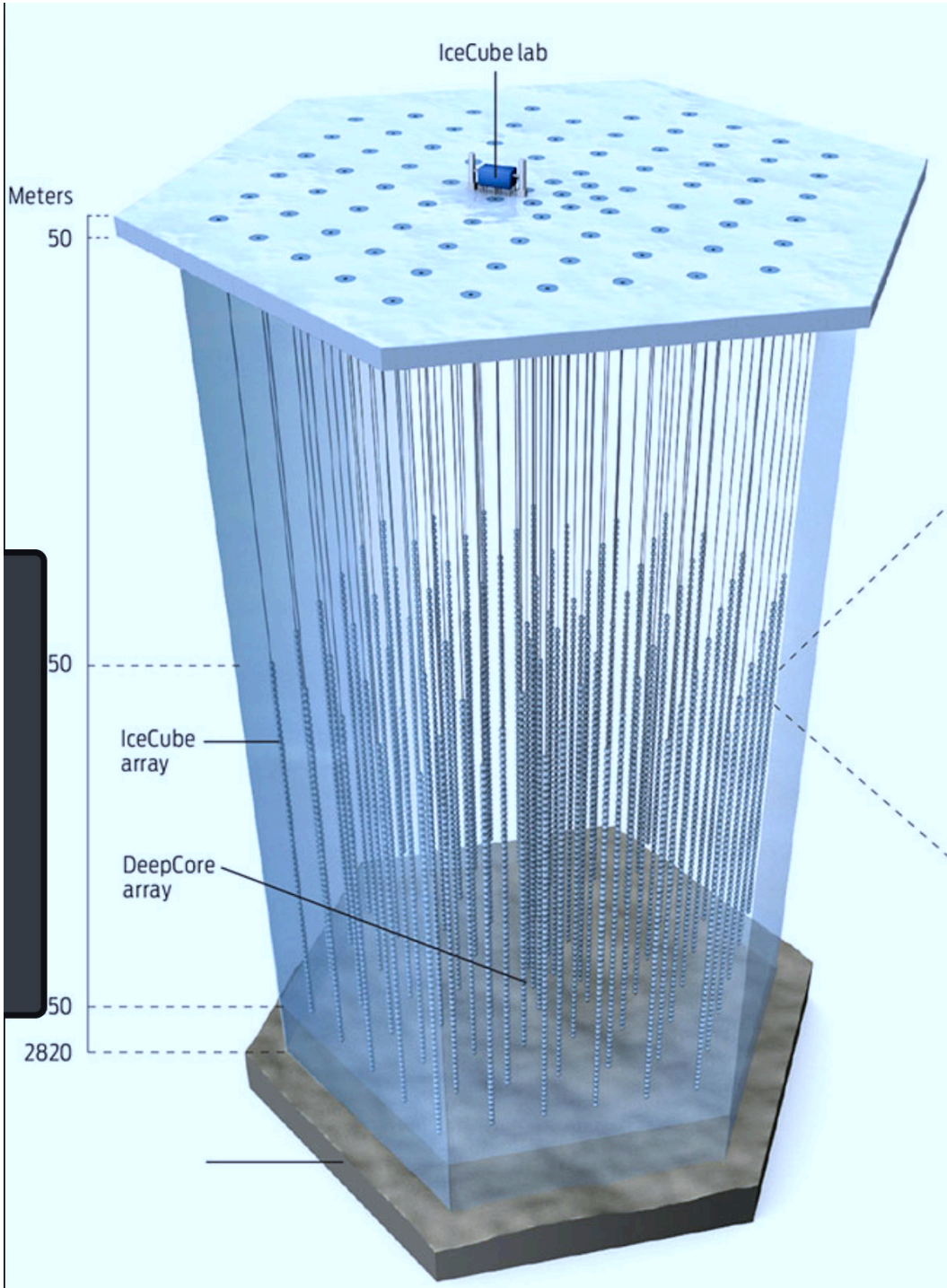

IceCube
South Pole Neutrino Observatory
50 m
IceTop
IceCube Laboratory
Data is collected here and sent by satellite to the data warehouse at UW–Madison
1450 m
86 strings of DOMs, set 125 meters apart
Amundsen–Scott South Pole Station, Antarctica
A National Science Foundation-managed research facility
60 DOMs on each string
DOMs are 17 meters apart
IceCube detector
DeepCore
Digital Optical Module (DOM)
5,160 DOMs deployed in the ice
2450 m
Antarctic bedrock


IceCube Lab
IceTop
81 stations / 162 tanks
324 optical sensors
IceCube In-Ice Array
86 strings including DeepCore
5160 optical sensors
DeepCore
8 strings optimized for lower energies +
7 standard central strings
480 + 420 optical sensors
Eiffel Tower
324 m
optical sensor
Bedrock
50 m
Y(m)
X (m)
600
400
200
0
-200
-400
-600

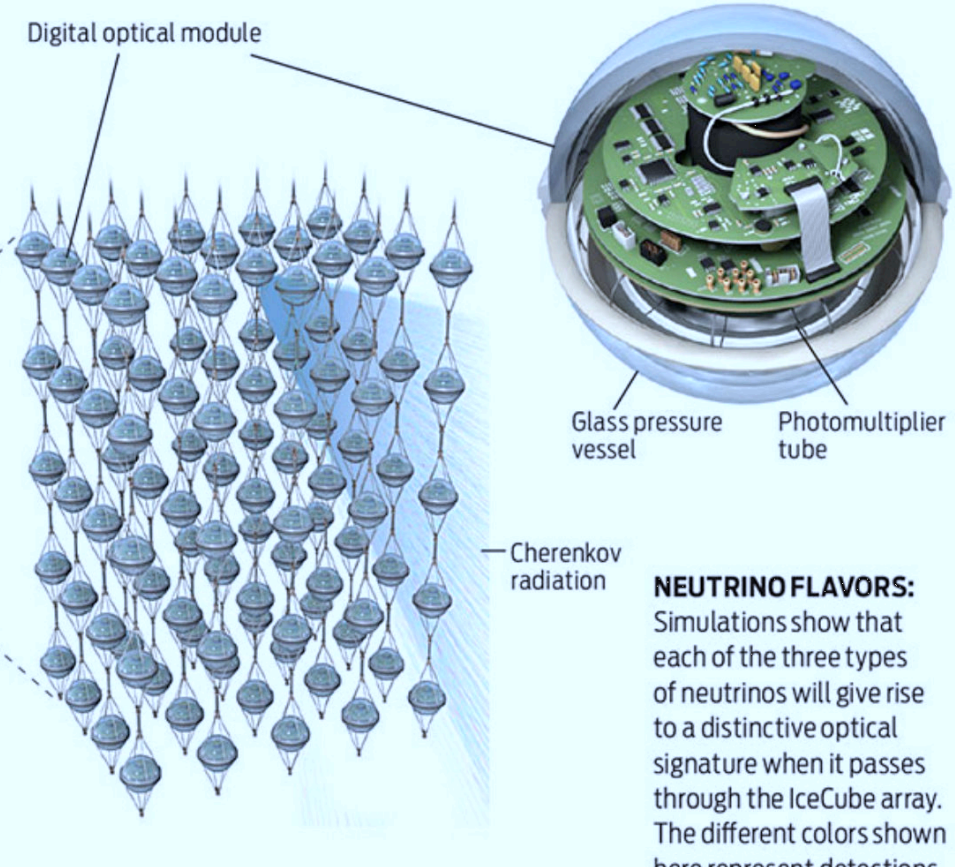
IceCube/DeepCore



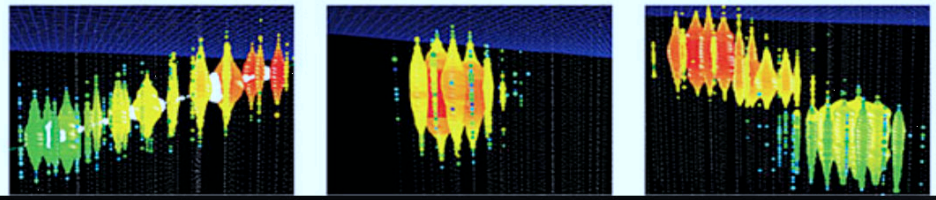
IceCube Digital Optical Module (DOM)



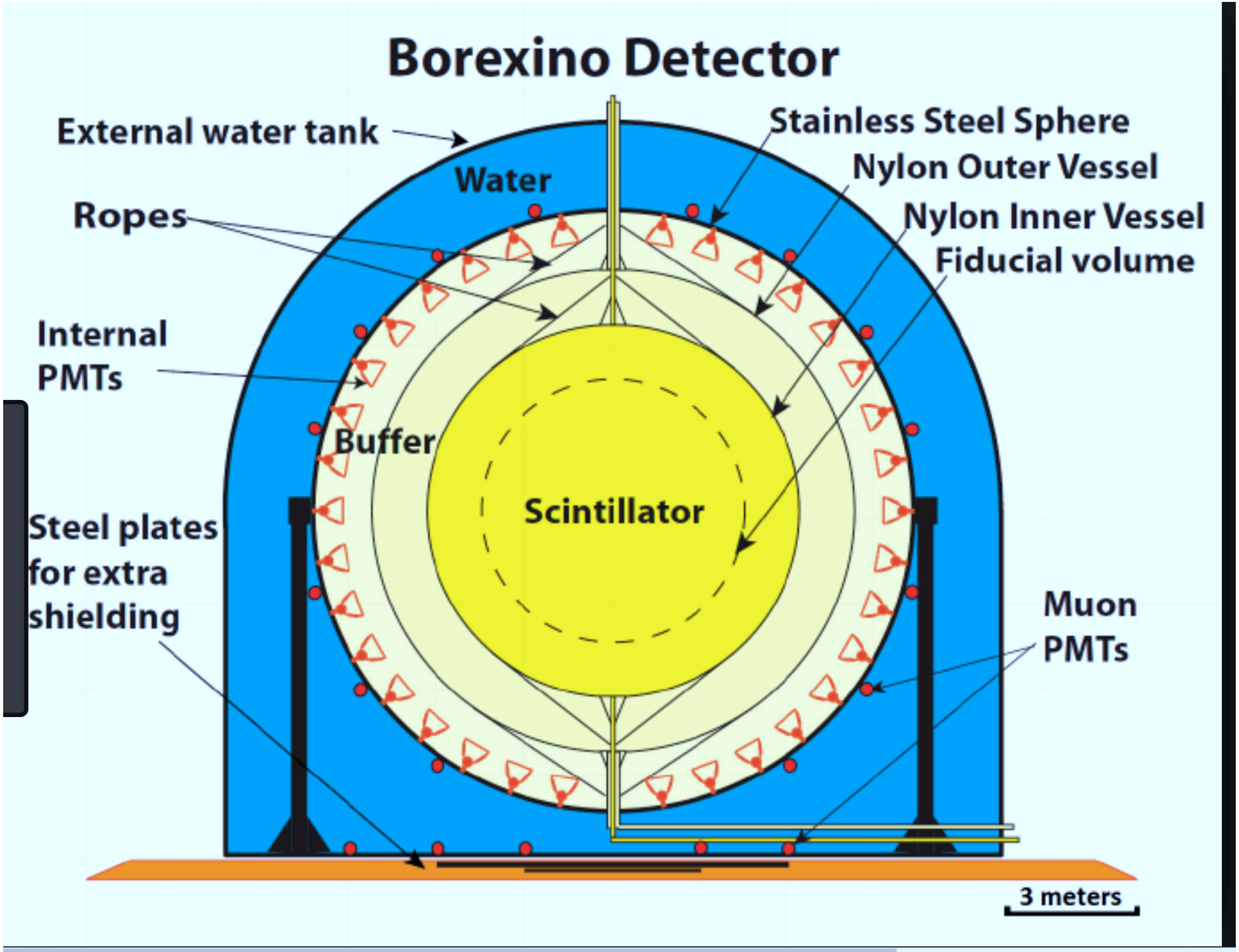
ELECTRONIC PEARLS: The digital optical modules used to sense the passage of neutrinos through the ice are encased in spherical pressure vessels made of borosilicate glass. They are attached to their suspending cables at 17-meter vertical intervals, from 1450 to 2450 meters' depth. After a string has been deployed and tested, the surrounding water (left over from drilling the hole) freezes the detectors in place.



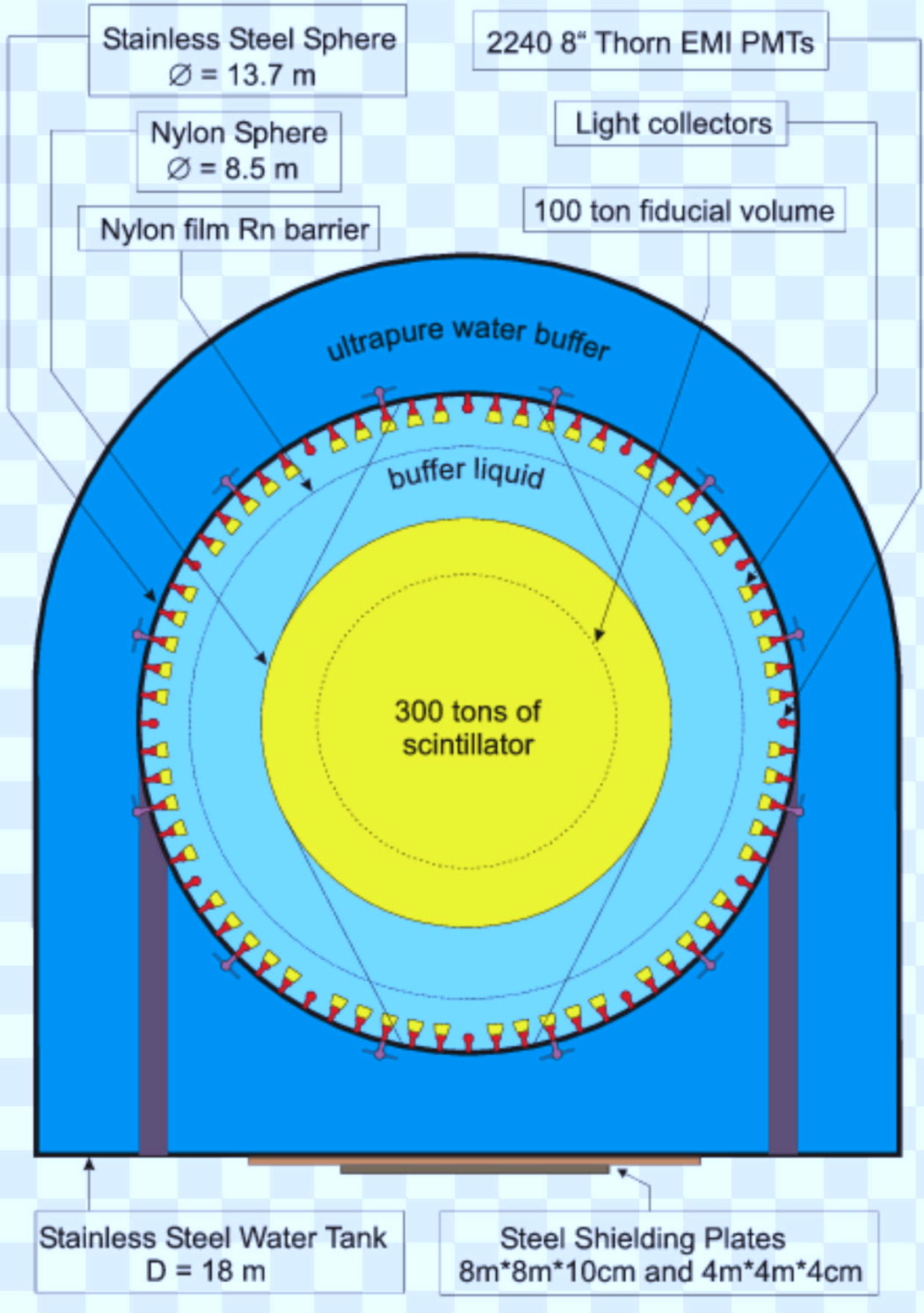
NEUTRINO FLAVORS: Simulations show that each of the three types of neutrinos will give rise to a distinctive optical signature when it passes through the IceCube array. The different colors shown here represent detections taking place at slightly different times.

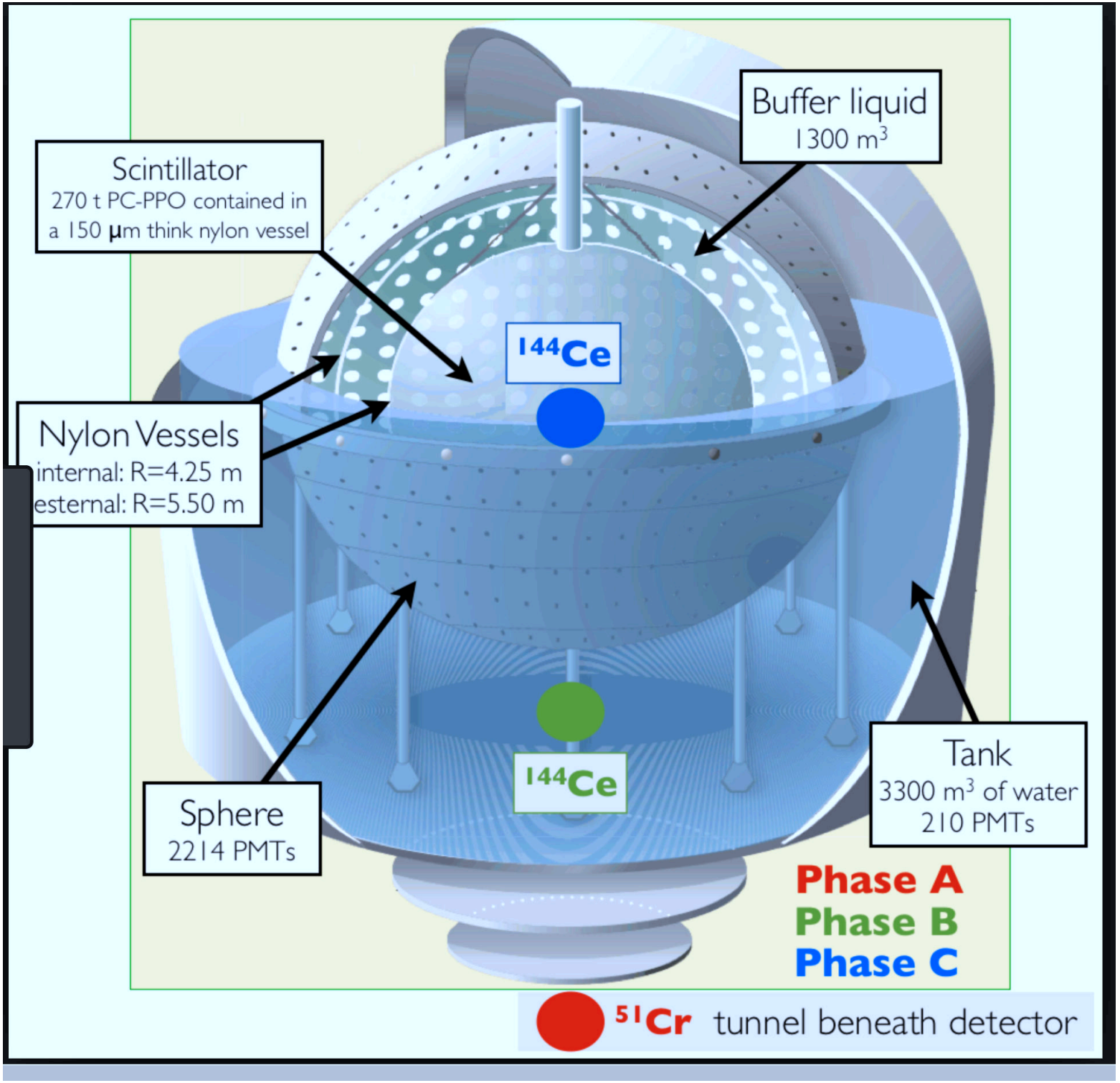


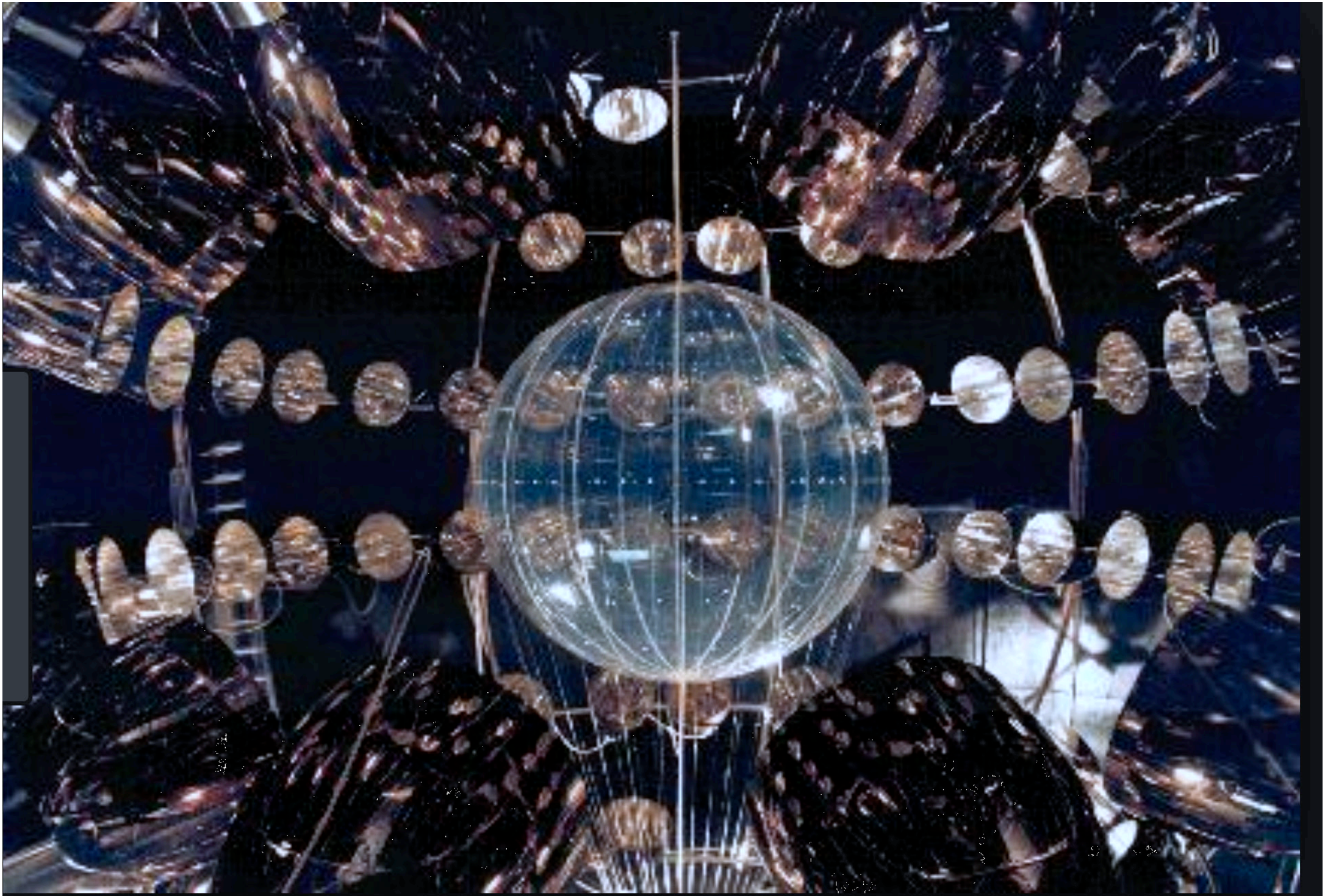
SCIENCE PHOTO LIBRARY

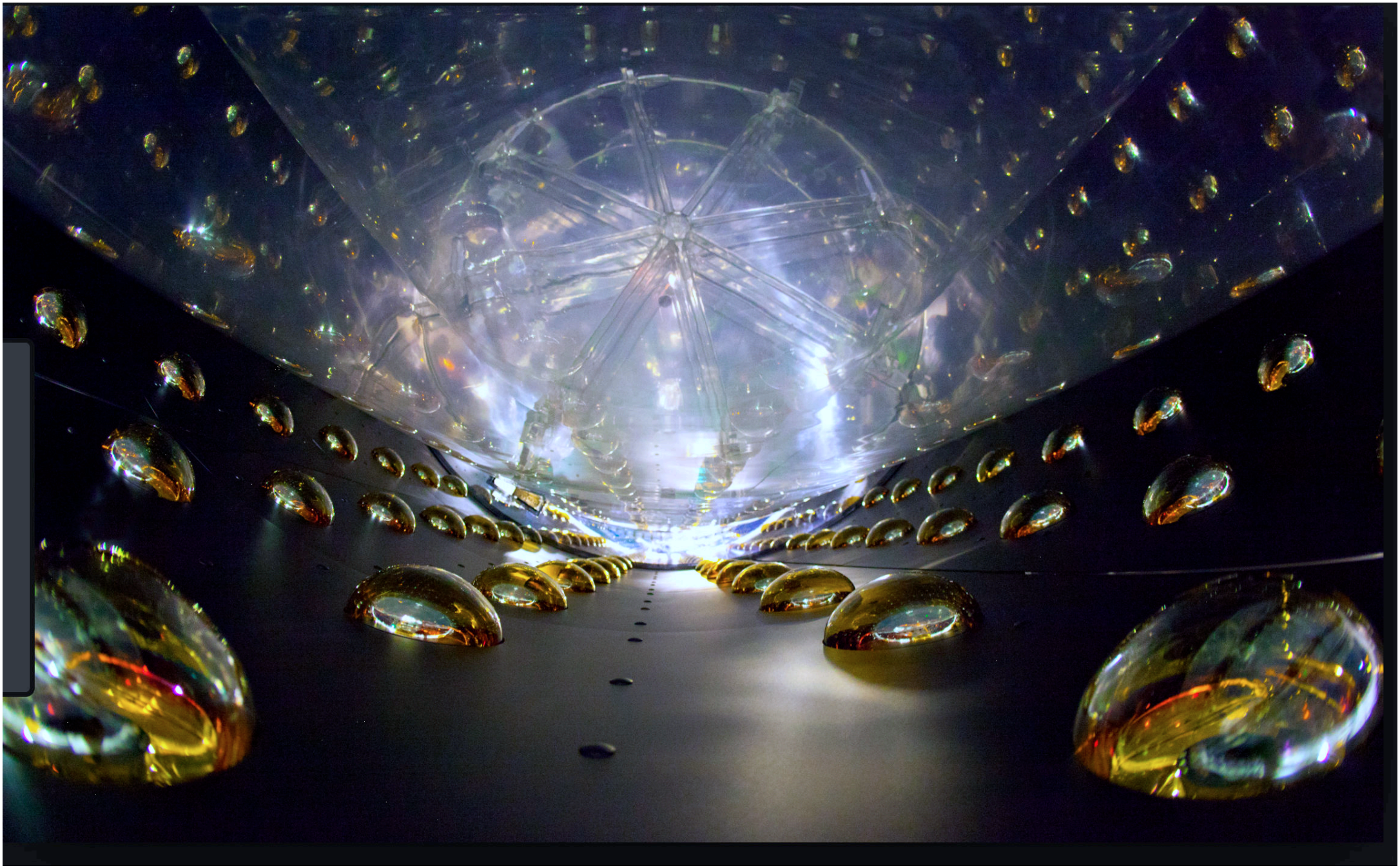

Borexino Detector
External water tank
Water
Stainless Steel Sphere
Nylon Outer Vessel
Nylon Inner Vessel
Fiducial volume
Ropes
Internal
PMTs
Buffer
Scintillator
Steel plates
for extra
shielding
Muon
PMTs
3 meters

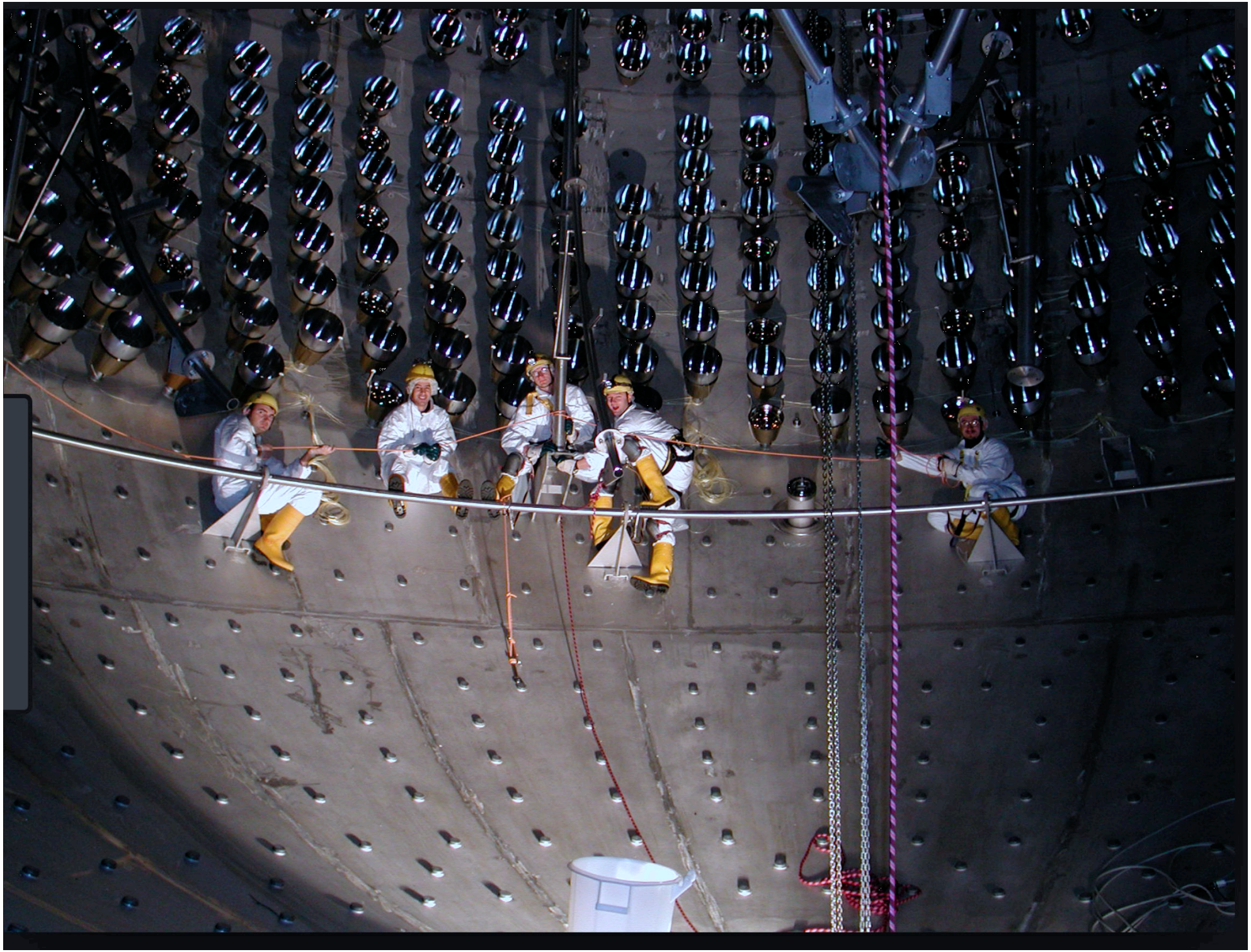
Borexino Detector Design

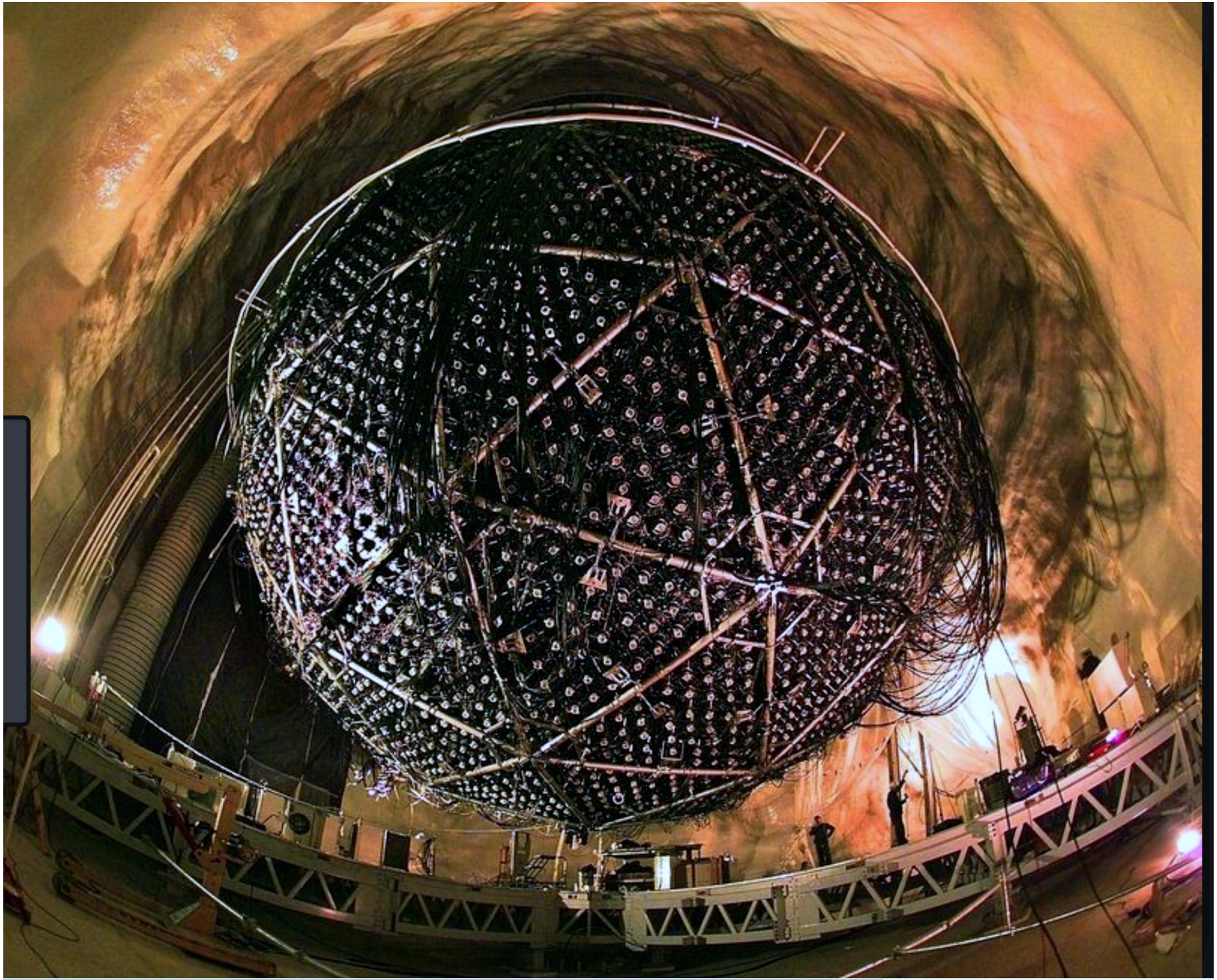


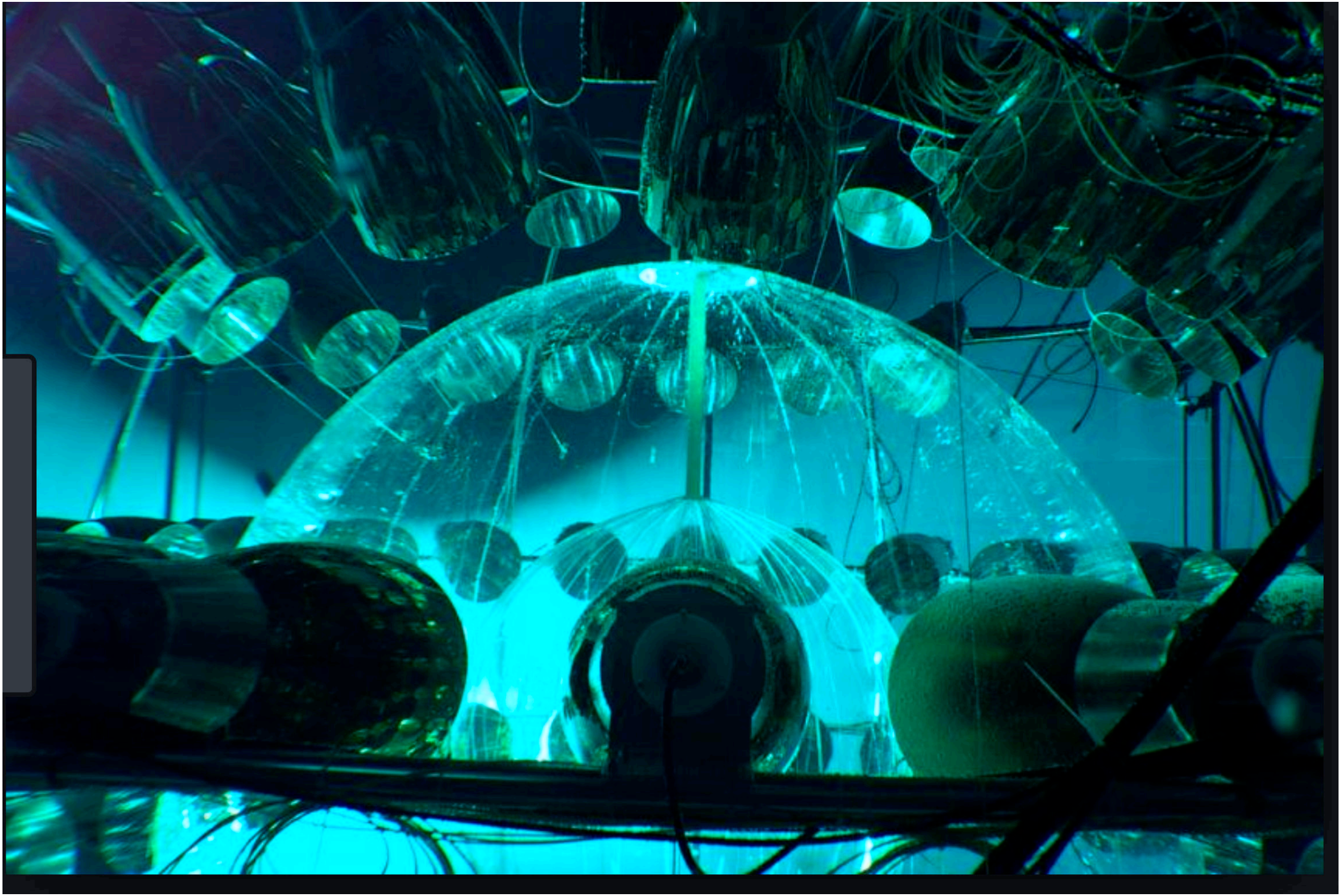

Buffer liquid
1300 m3
Scintillator
270 t PC-PPO contained in
a 150 μm think nylon vessel
144Ce
Nylon Vessels
internal: R=4.25 m
esternal: R=5.50 m
144Ce
Sphere
2214 PMTs
Tank
3300 m3 of water
210 PMTs
Phase A
Phase B
Phase C
51Cr tunnel beneath detector

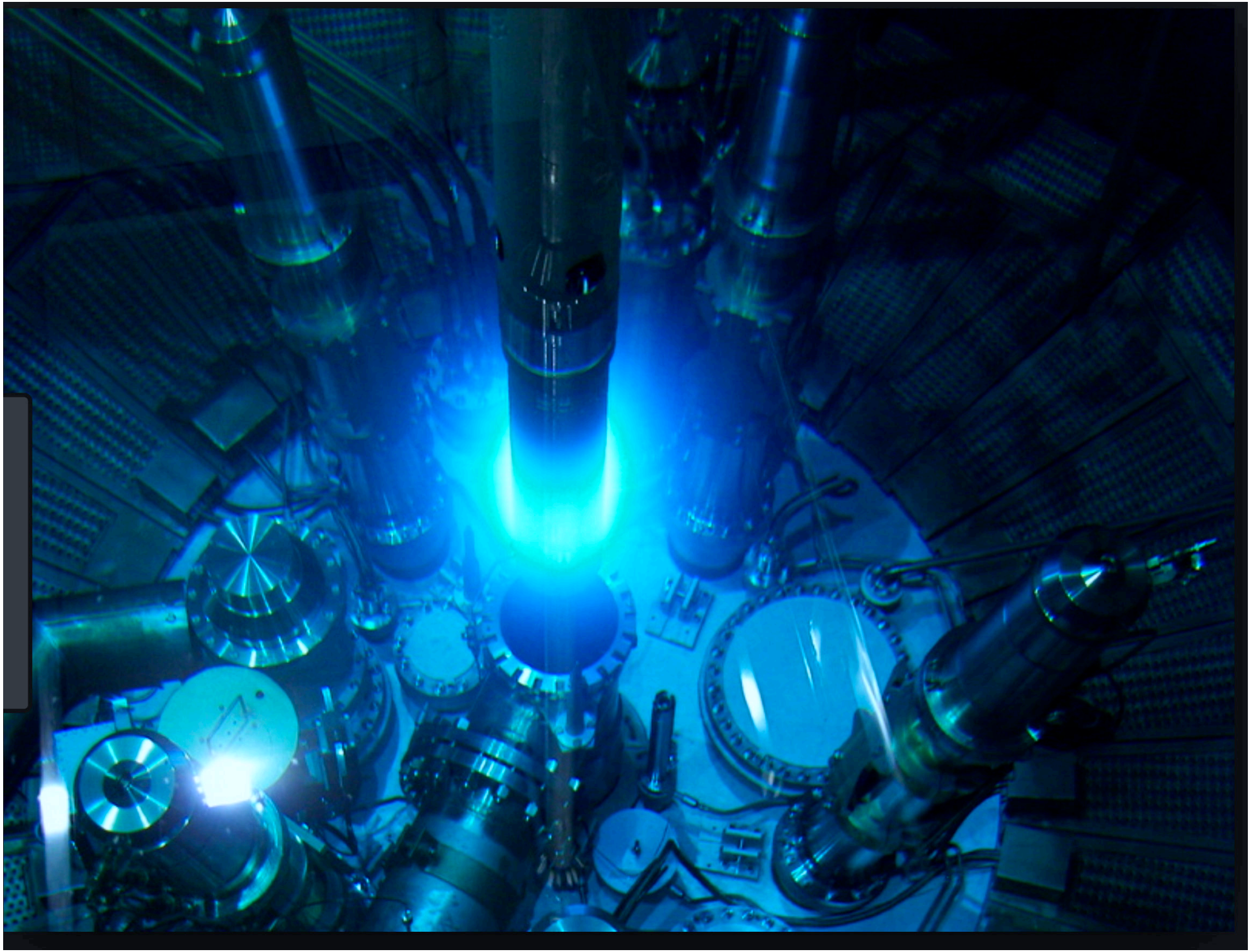


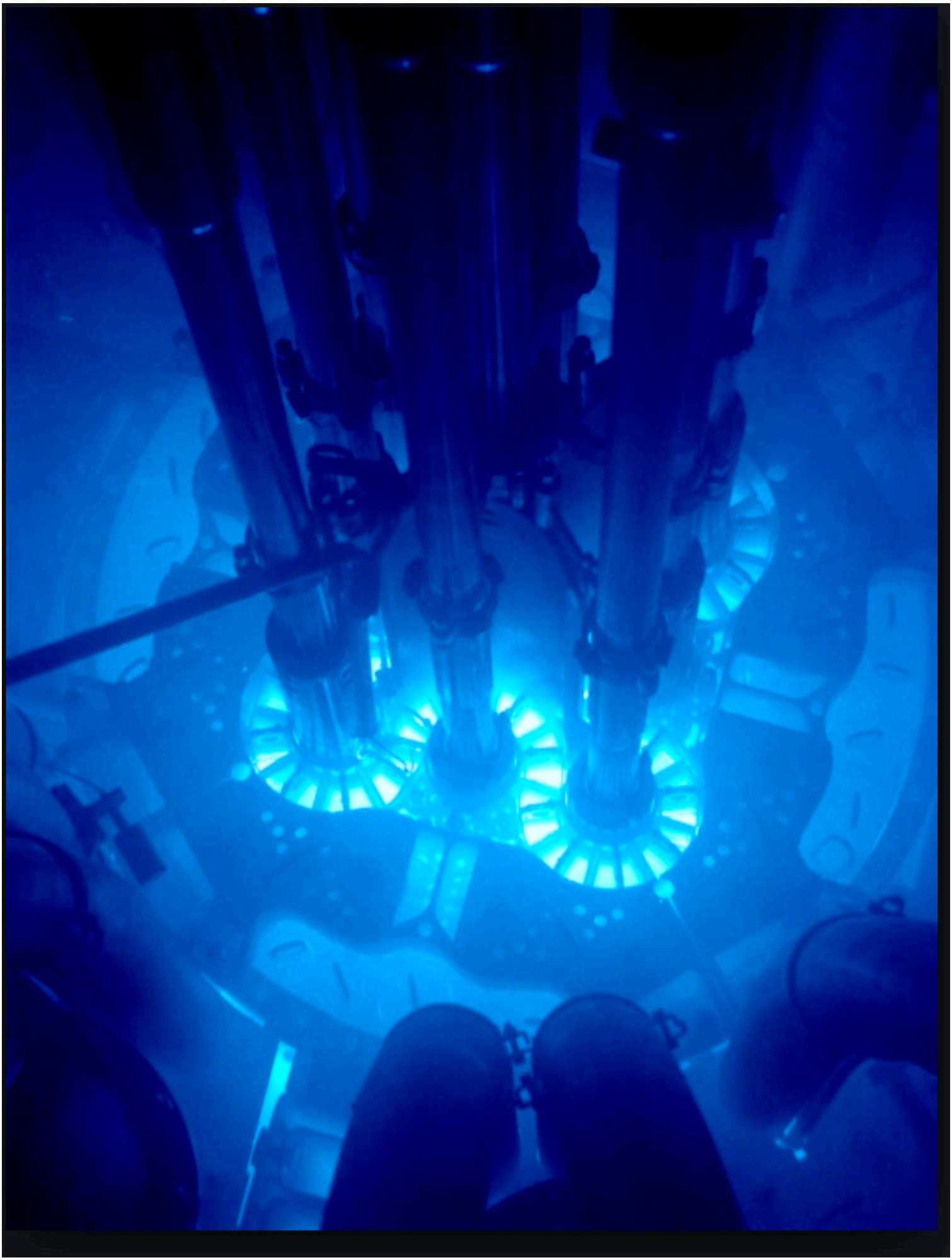


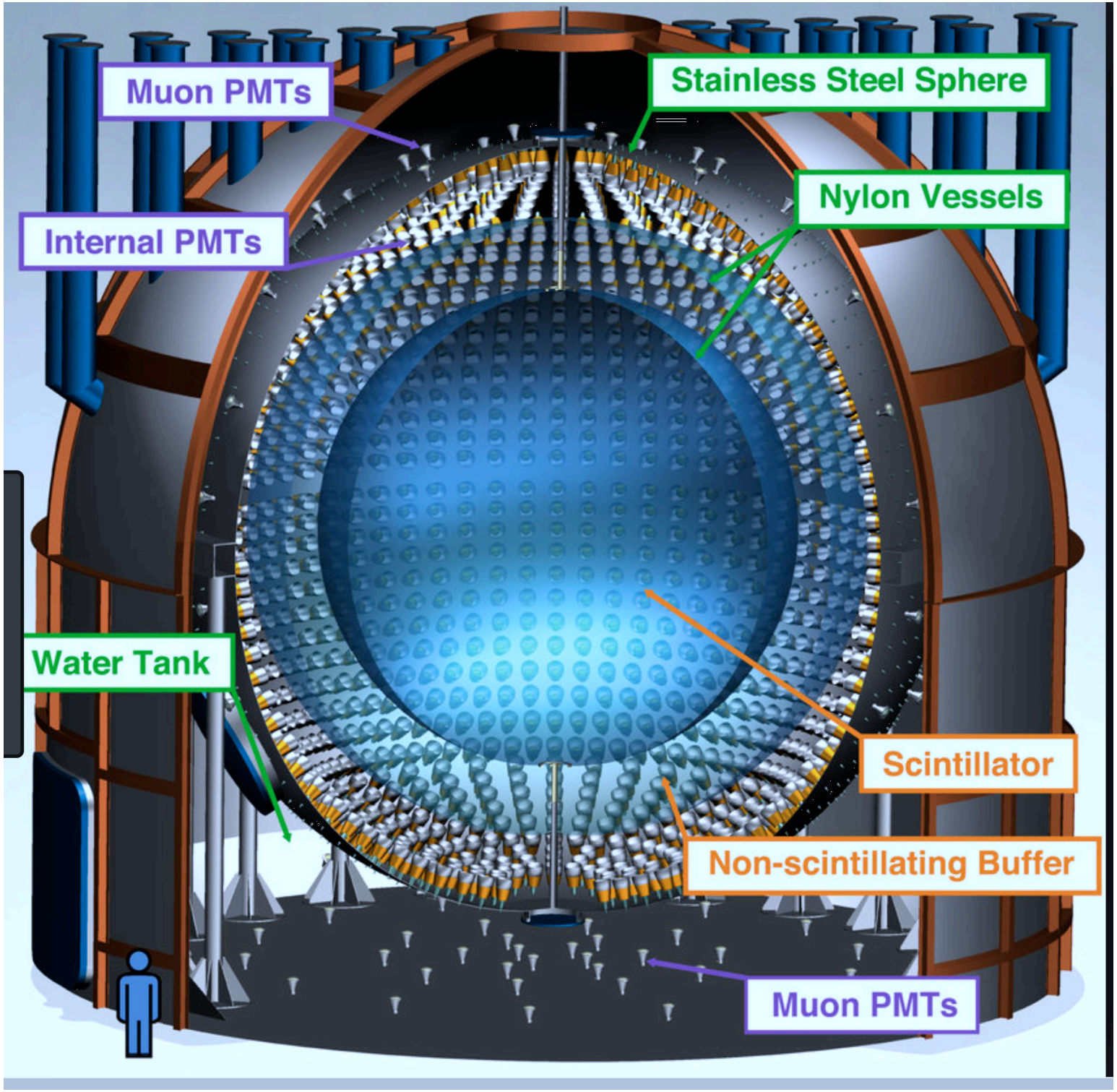


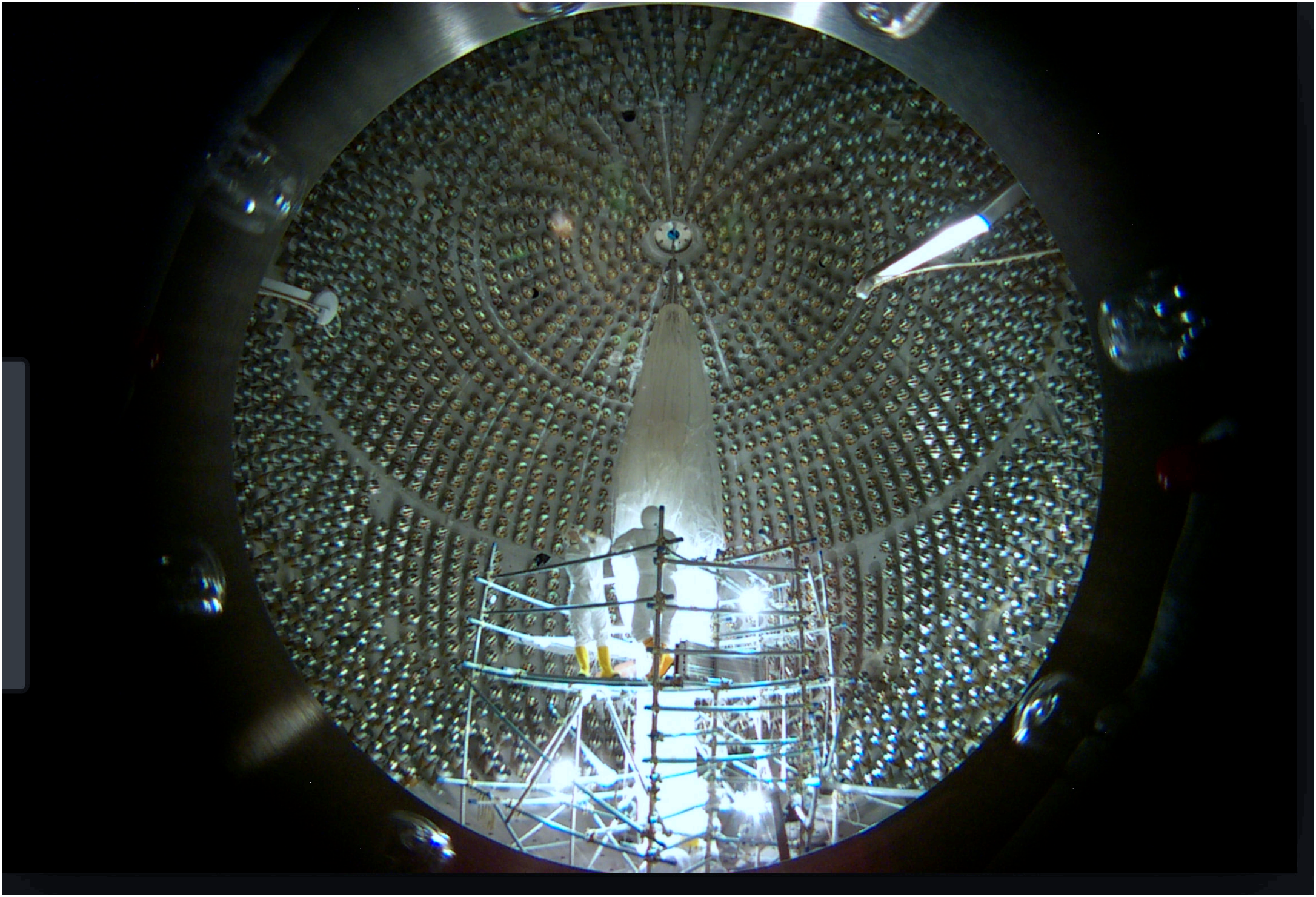


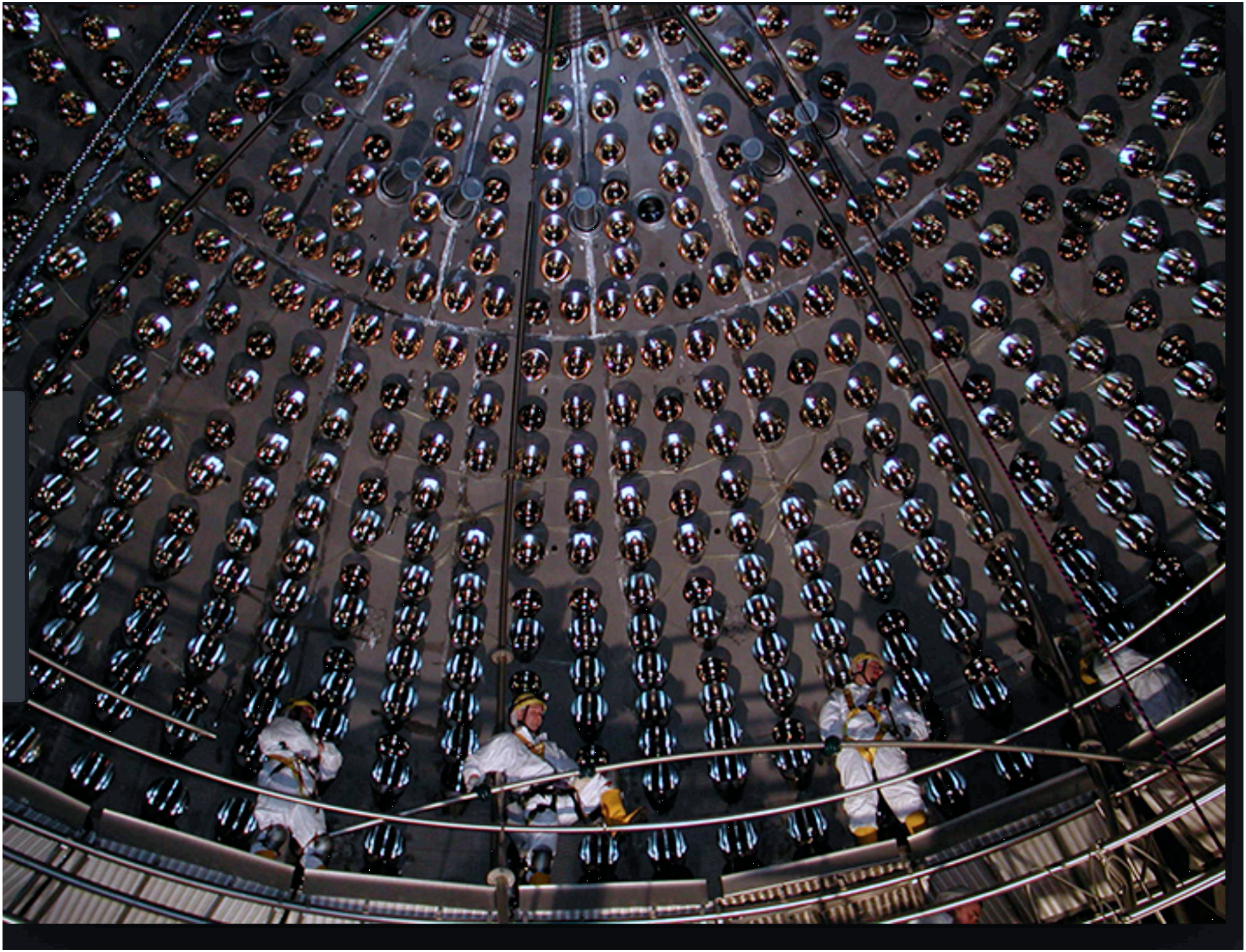


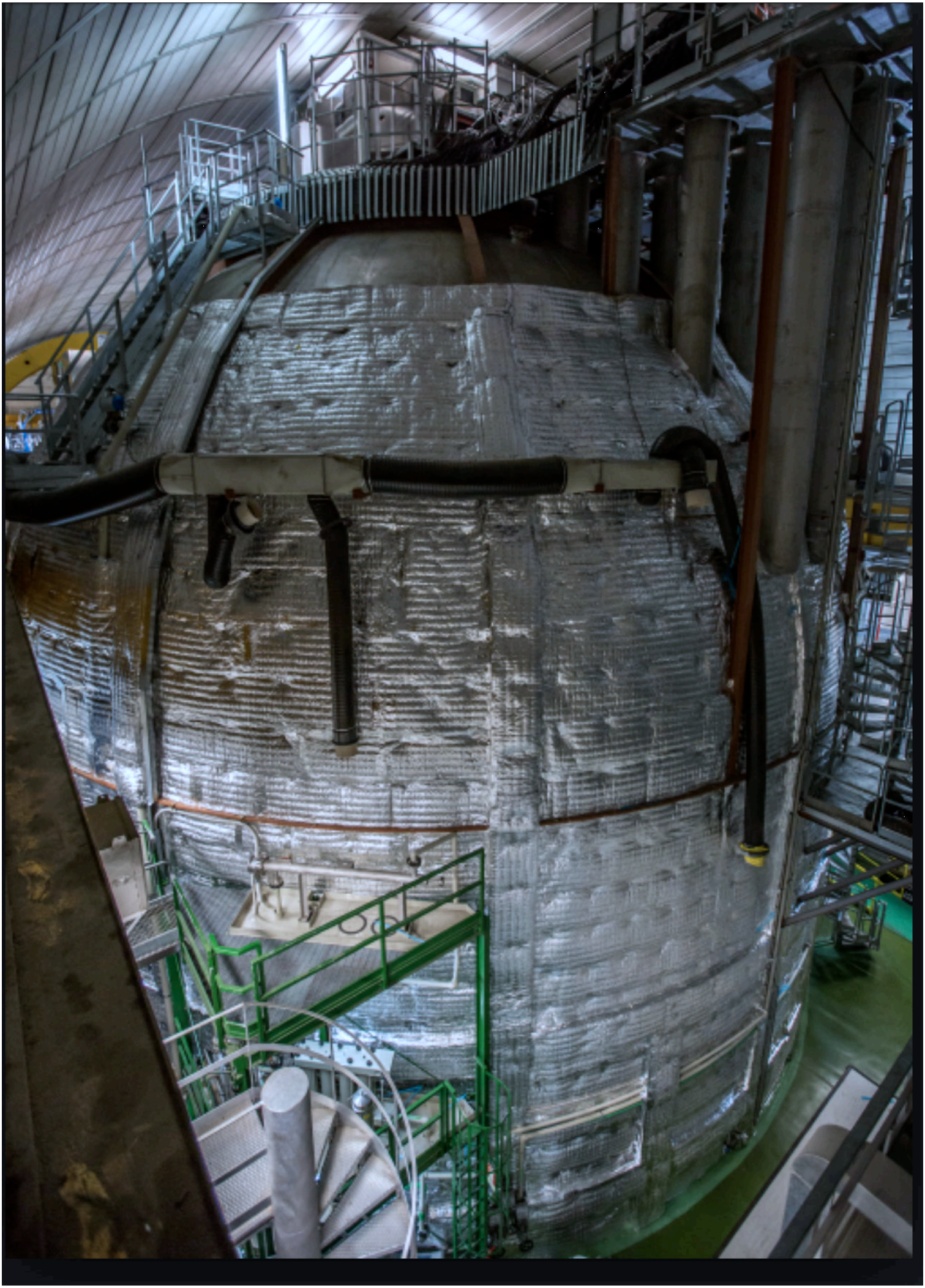




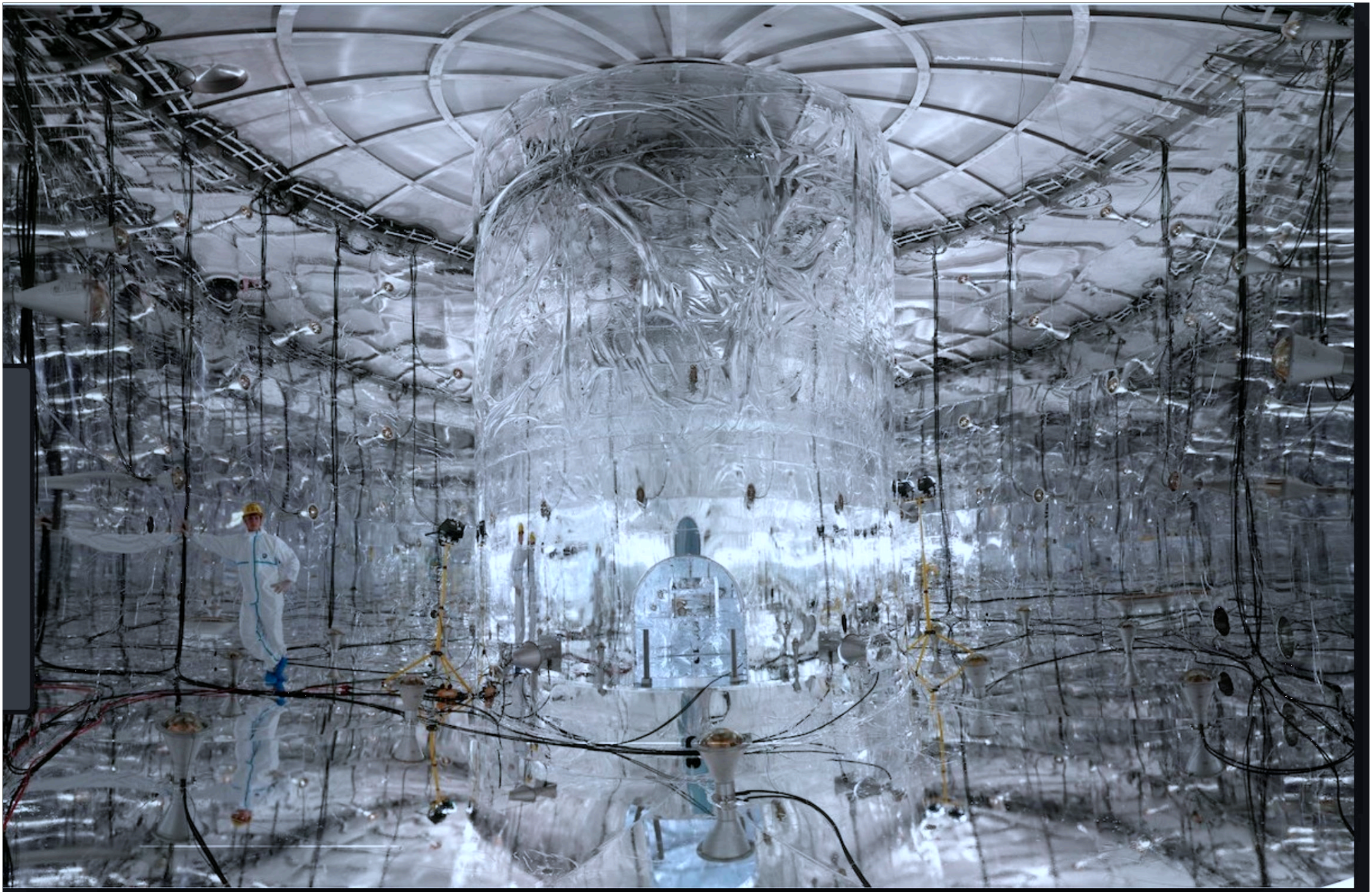

Muon PMTs
Stainless Steel Sphere
Nylon Vessels
Internal PMTs
Water Tank
Scintillator
Non-scintillating Buffer
Muon PMTs



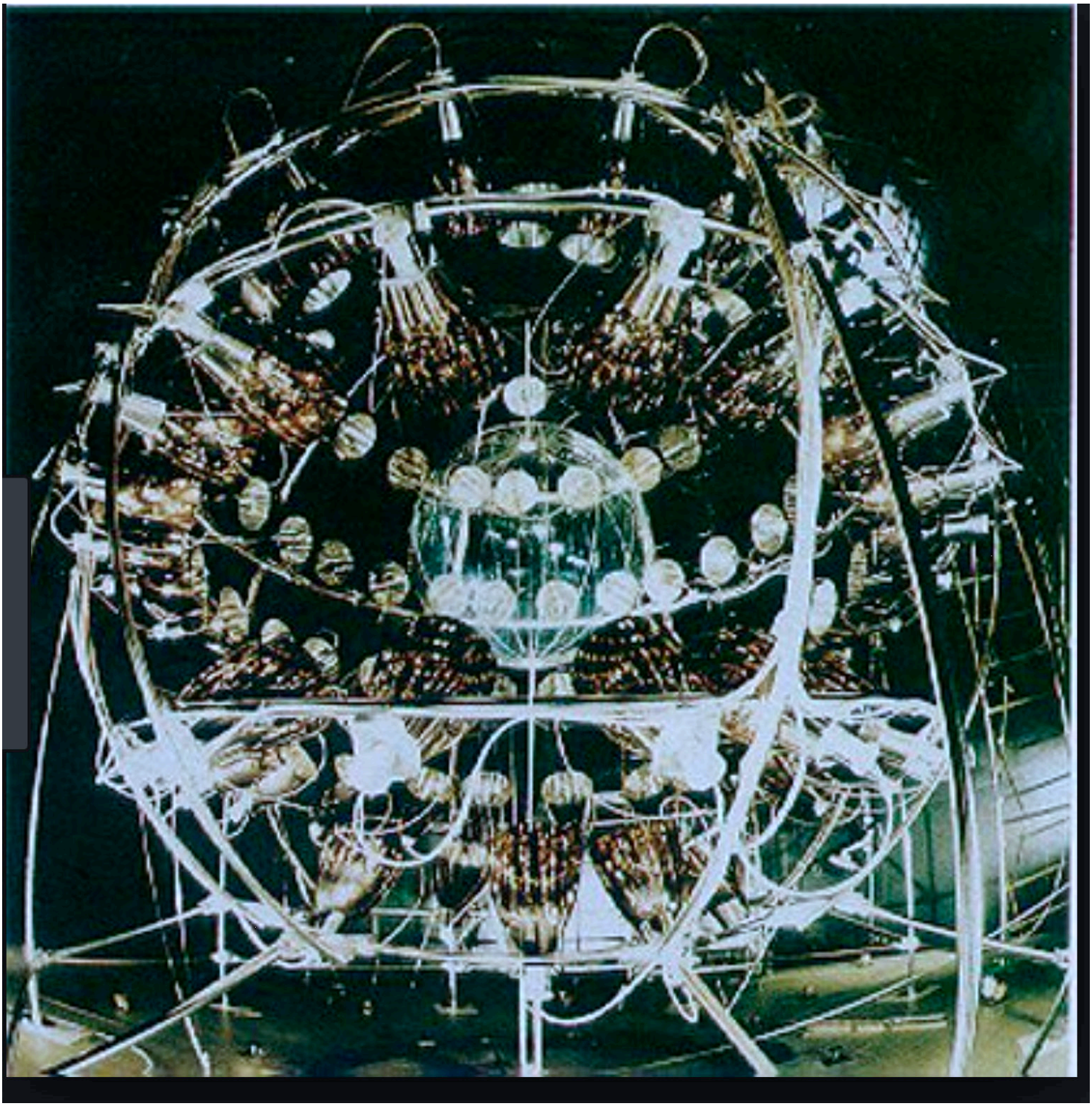




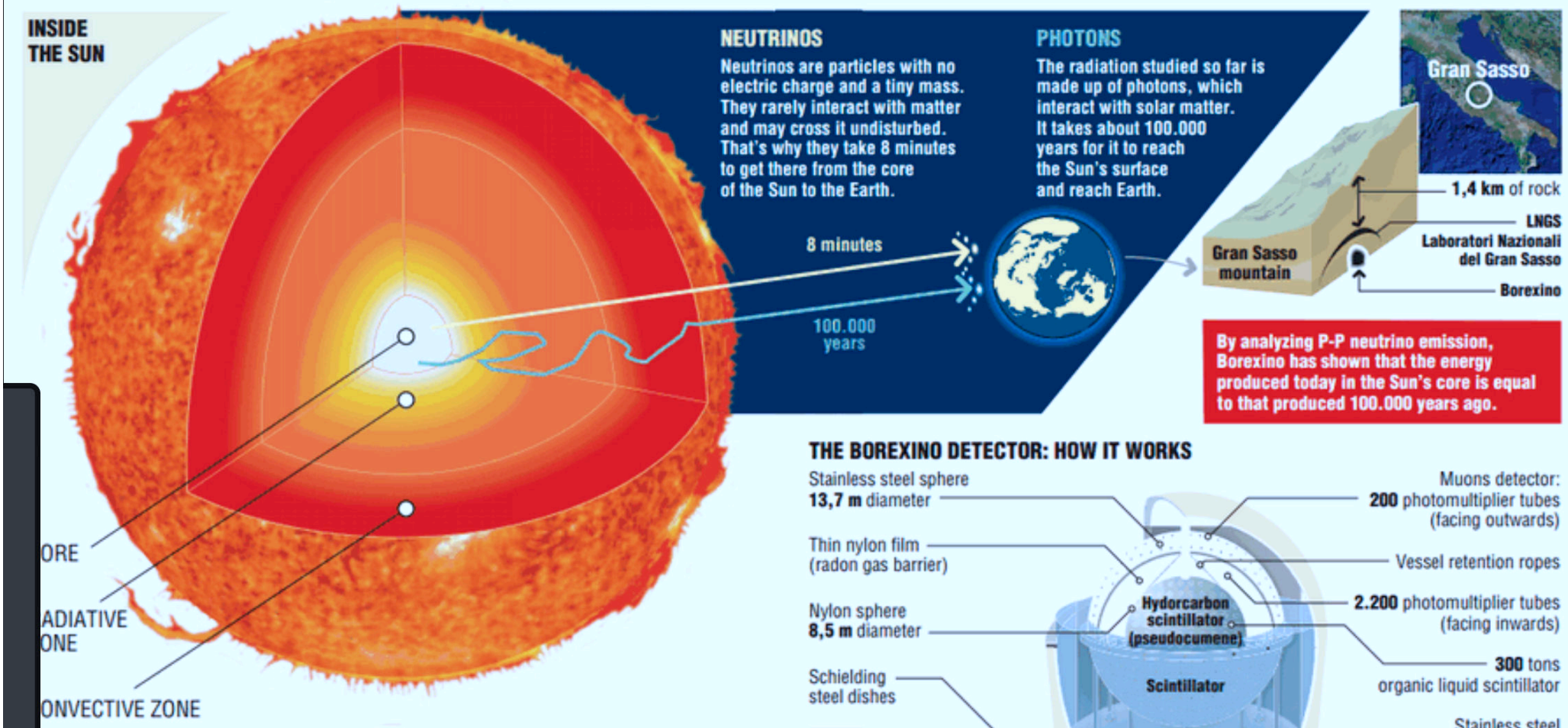
inside of the CTF purification plant. The pipe in the center leads down to the scintillator containment vessel



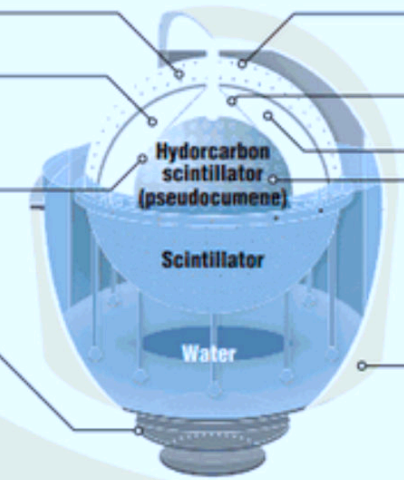
MPG GERmanium Detector Array (GERDA) at Gran Sasso, Italy



THE SUN AS BOREXINO SEES IT IN REAL TIME



THE BOREXINO DETECTOR: HOW IT WORKS



Borexino displays a russian doll structure. Surrounded by 2.400 tons of highly purified water, a stainless steel sphere contains 1.000 tons of a liquid hydrocarbon (pseudocumene). At its center, within a smaller nylon sphere, are 300 tons of scintillating liquid.

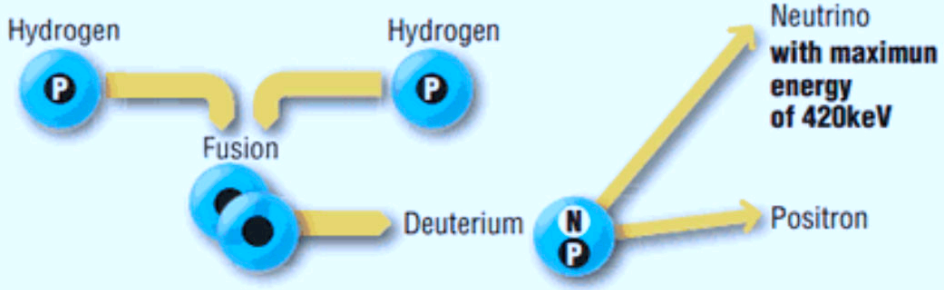
Within this innermost sphere neutrinos interact with the liquid scintillator producing small flashes of light.

The photomultiplier tubes, acting as ultra-sensitive artificial eyes, detect and record the light flashes produced by the neutrinos.

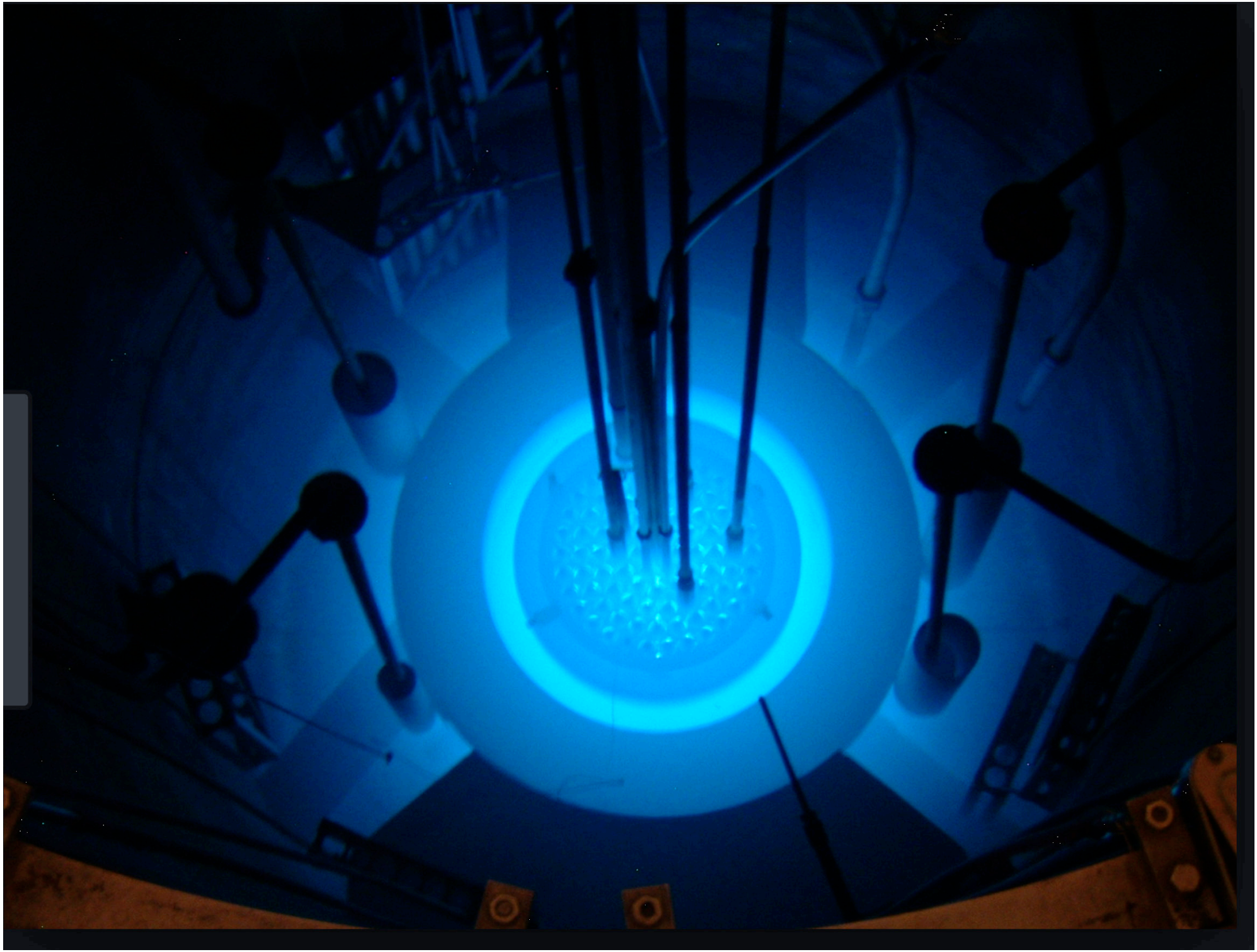
Borexino observes dozens of these signals every day.

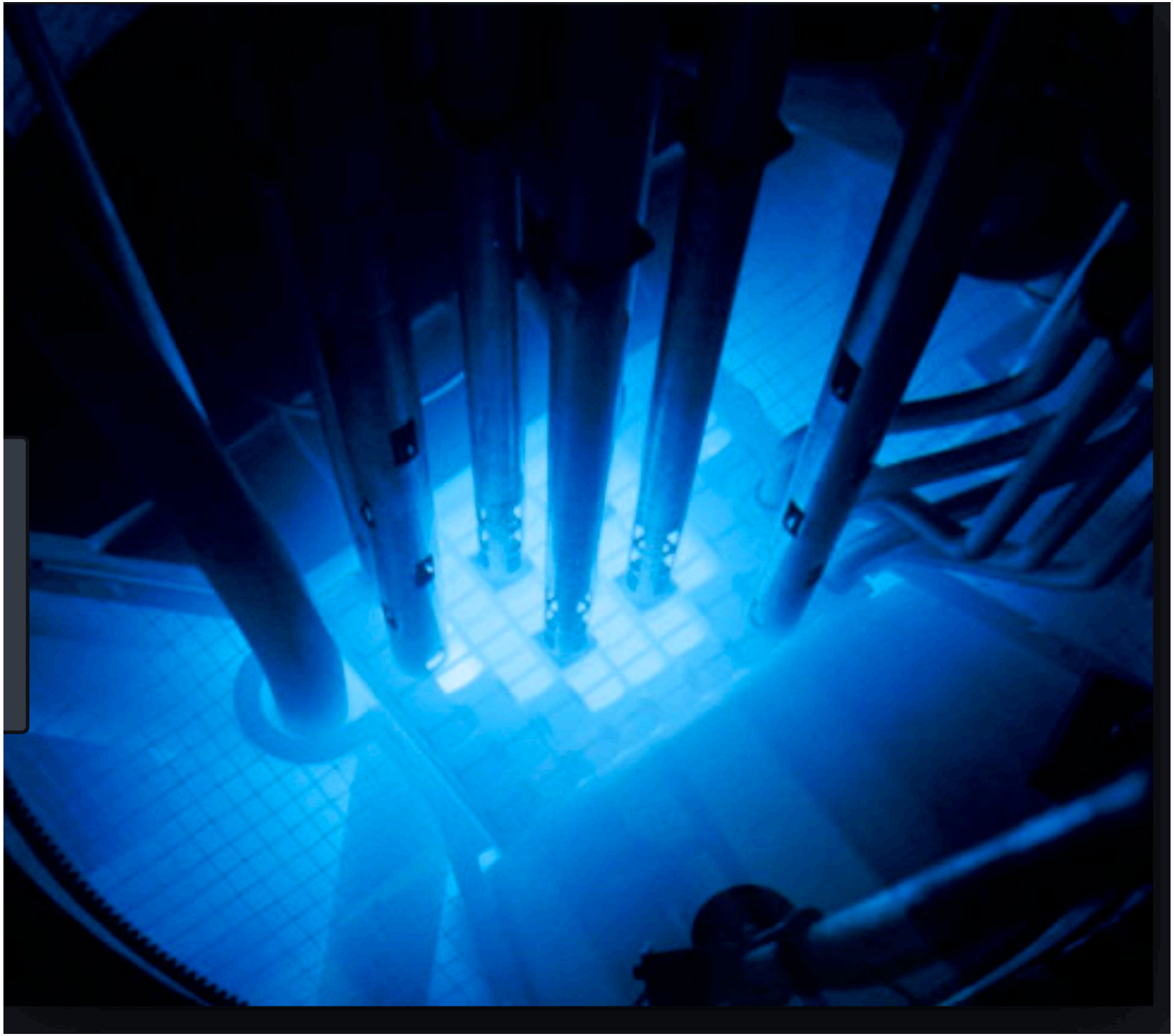
INFN Istituto Nazionale di Fisica Nucleare

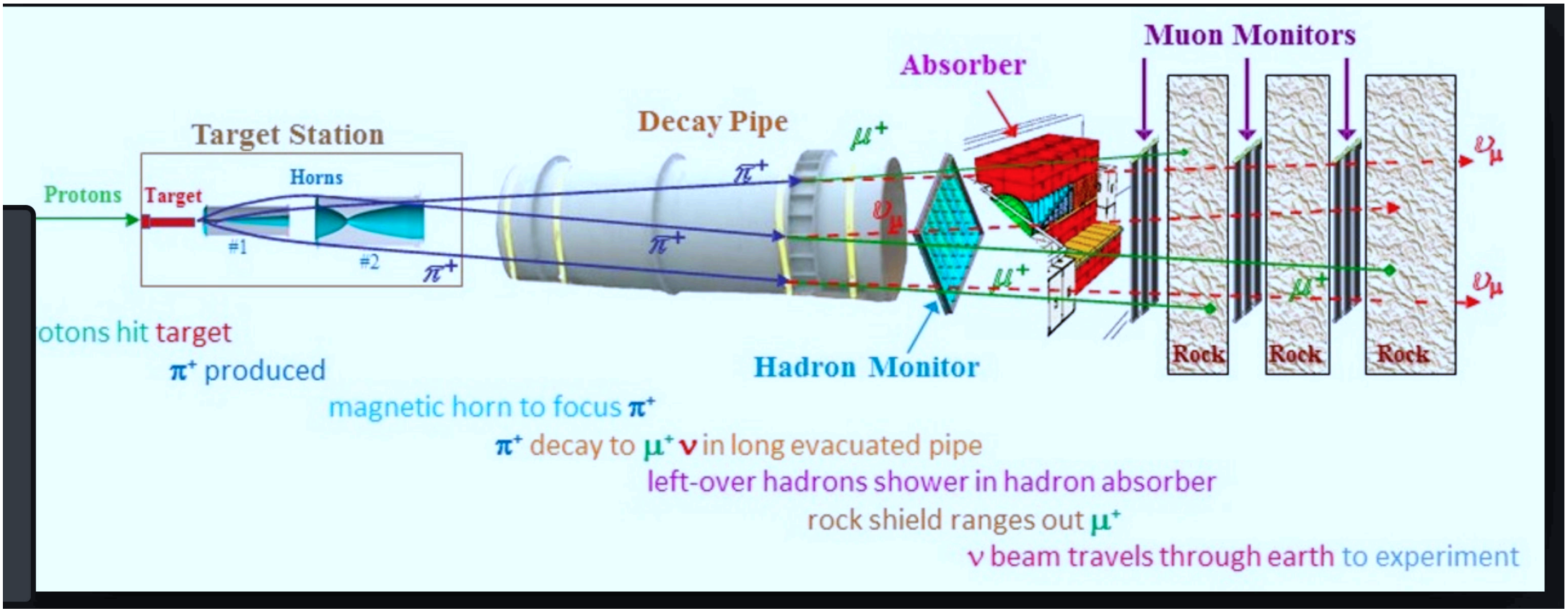
HE THERMONUCLEAR FUSION REACTION THAT PRODUCES HE P-P NEUTRINOS RECENTLY STUDIED BY BOREXINO



centimetri



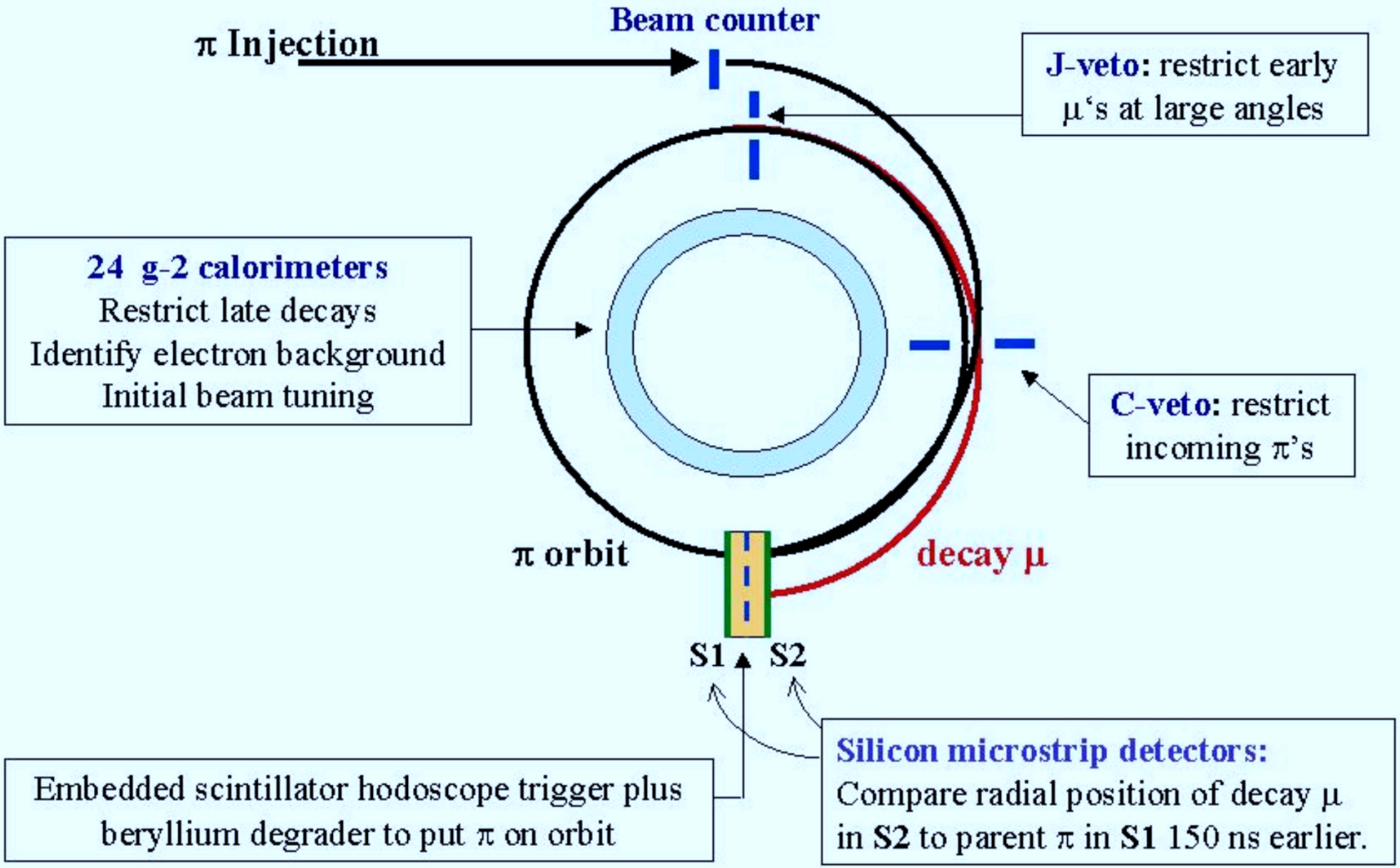


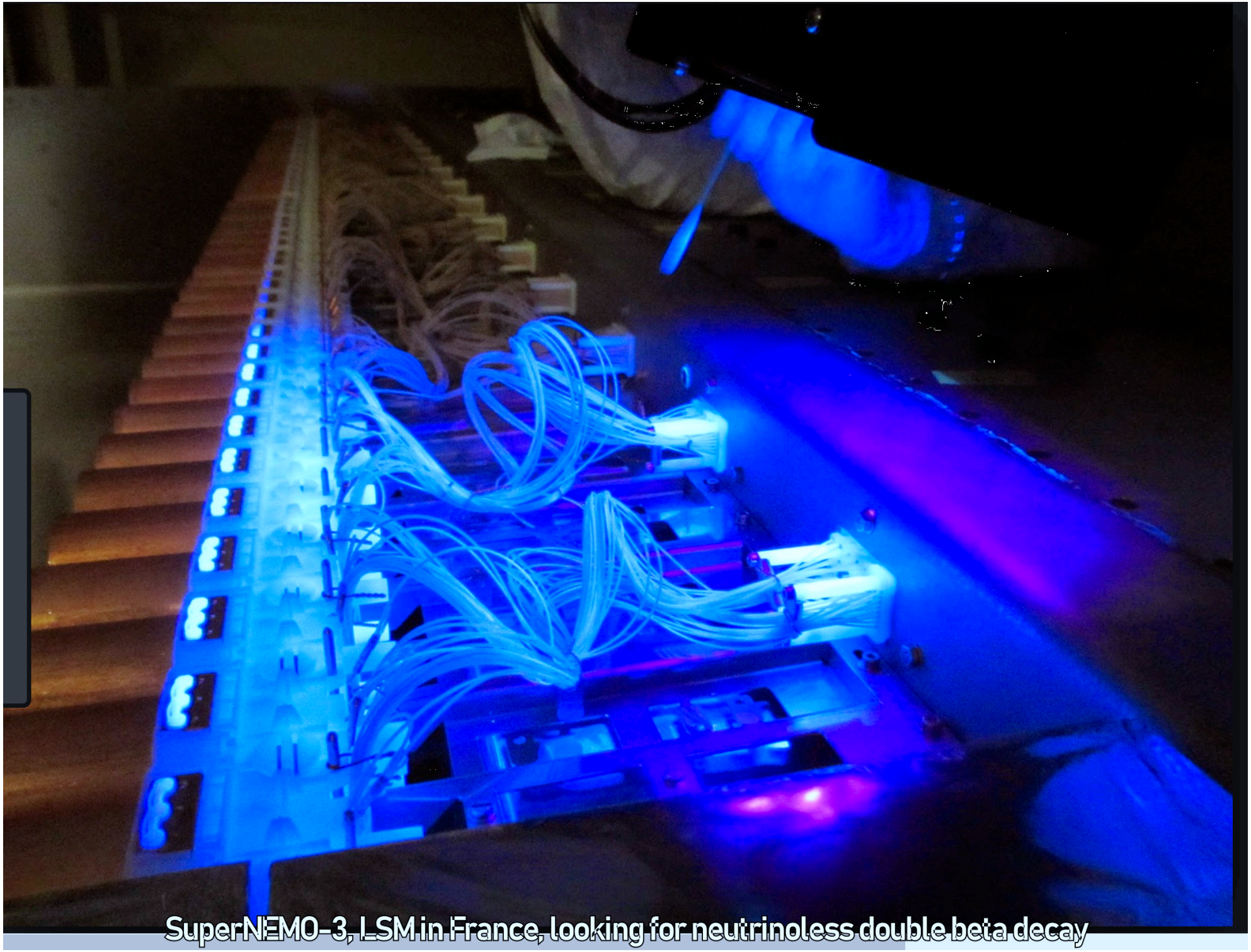

Muon Monitors
Absorber
Target Station
Decay Pipe
Protons
Target
Horns
#1
#2
Hadron Monitor
Rock
Rock
Rock
otons hit target
π⁺ produced
magnetic horn to focus π⁺
π⁺ decay to μ⁺ ν in long evacuated pipe
left-over hadrons shower in hadron absorber
rock shield ranges out μ⁺
ν beam travels through earth to experiment

E952: NuMass

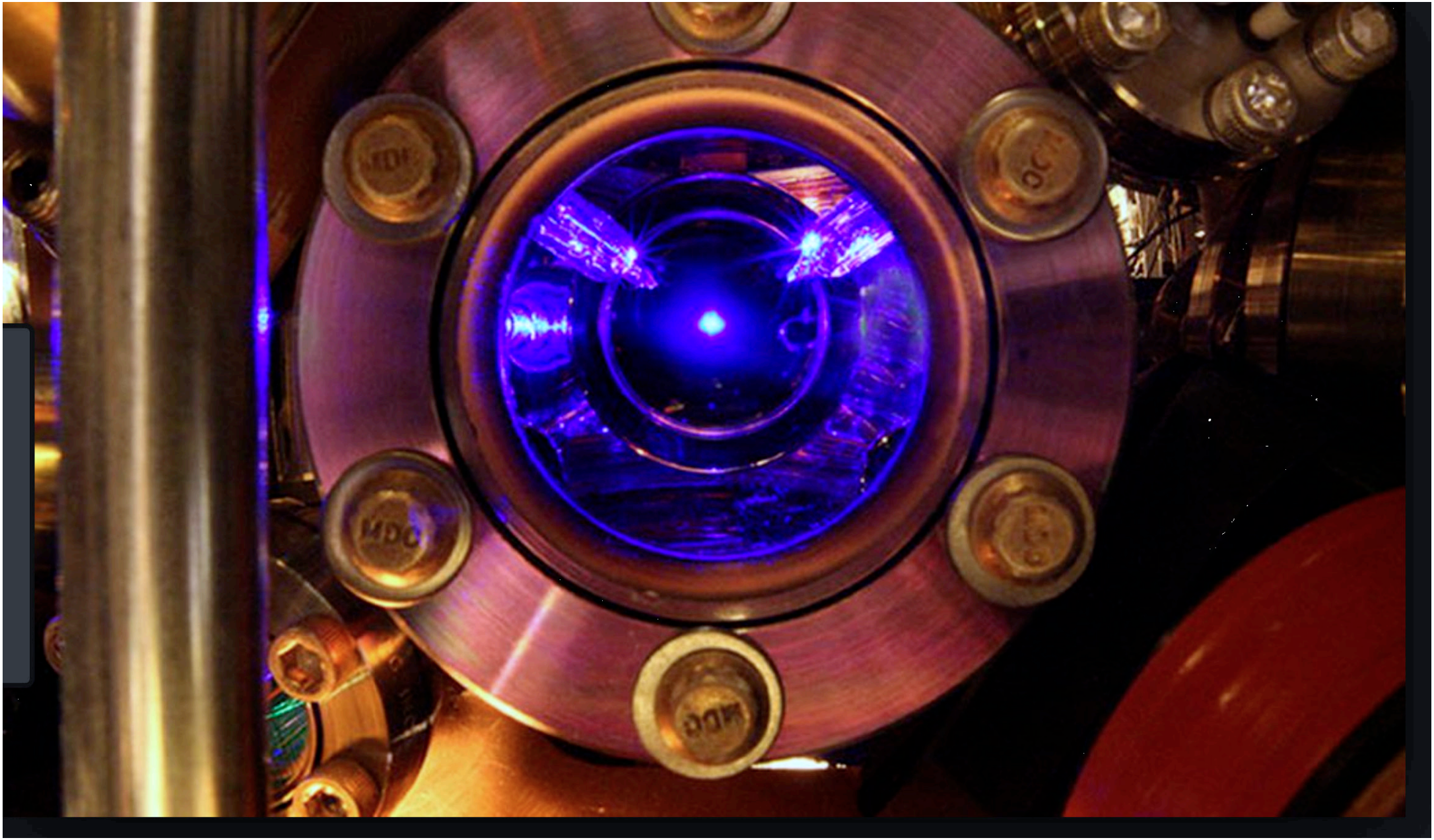
8 keV/c^2 Direct Muon Neutrino Mass Limit

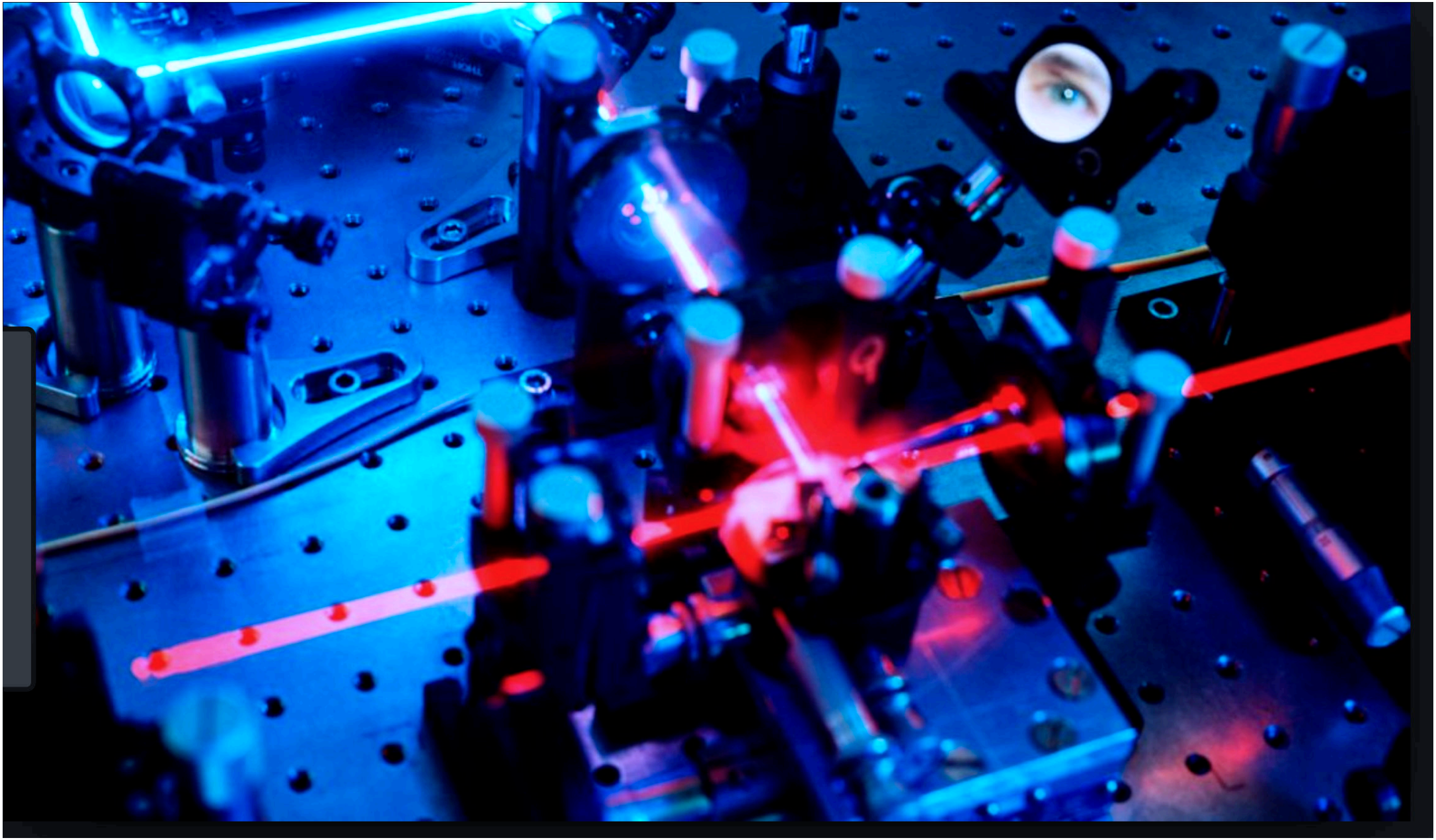
The 14 m diameter g-2 Storage Ring becomes a one-turn Spectrometer observing $\pi \rightarrow \mu\nu$ decay in flight





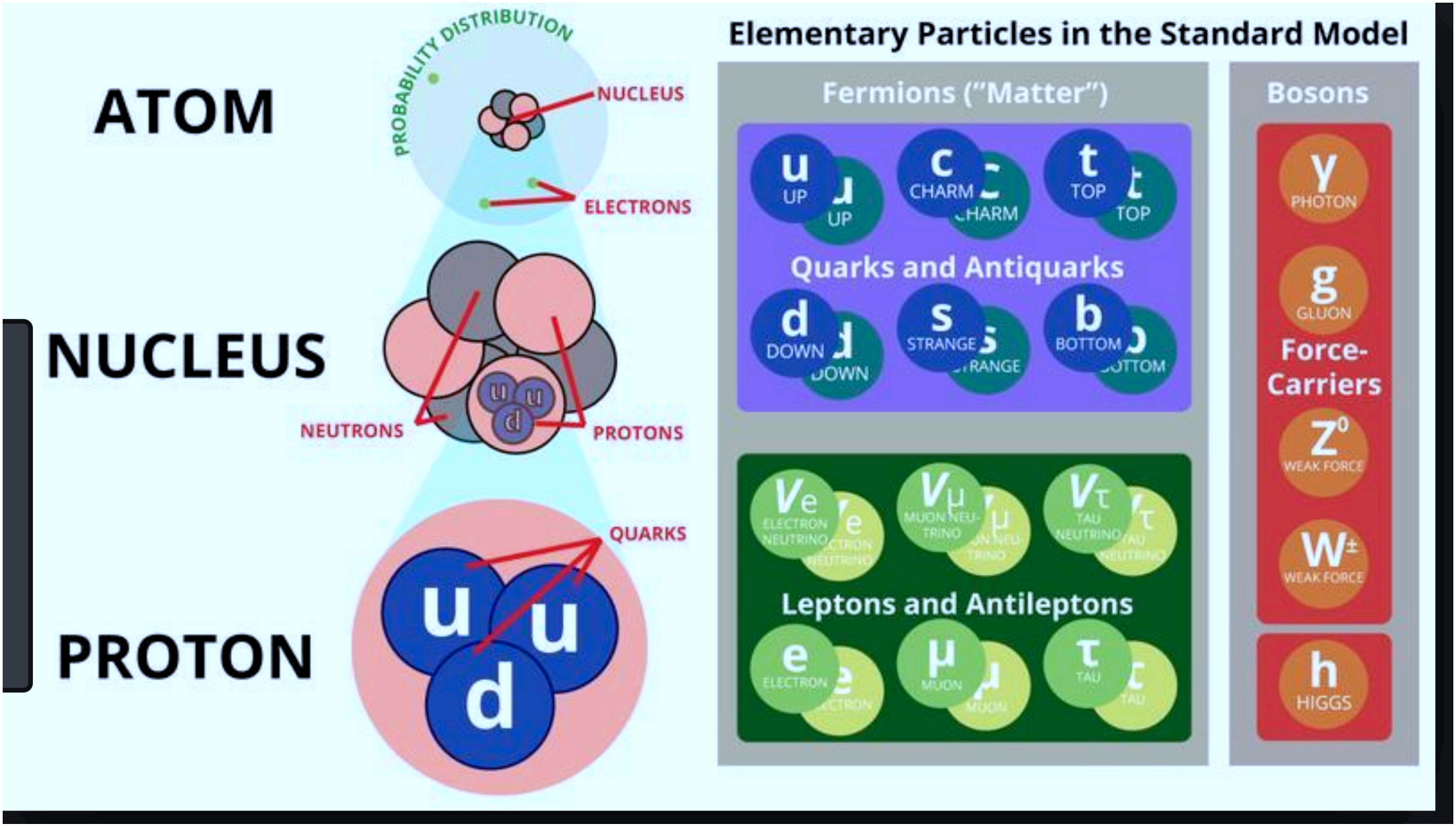
SuperNEMO-3, LSM in France, looking for neutrinoless double beta decay

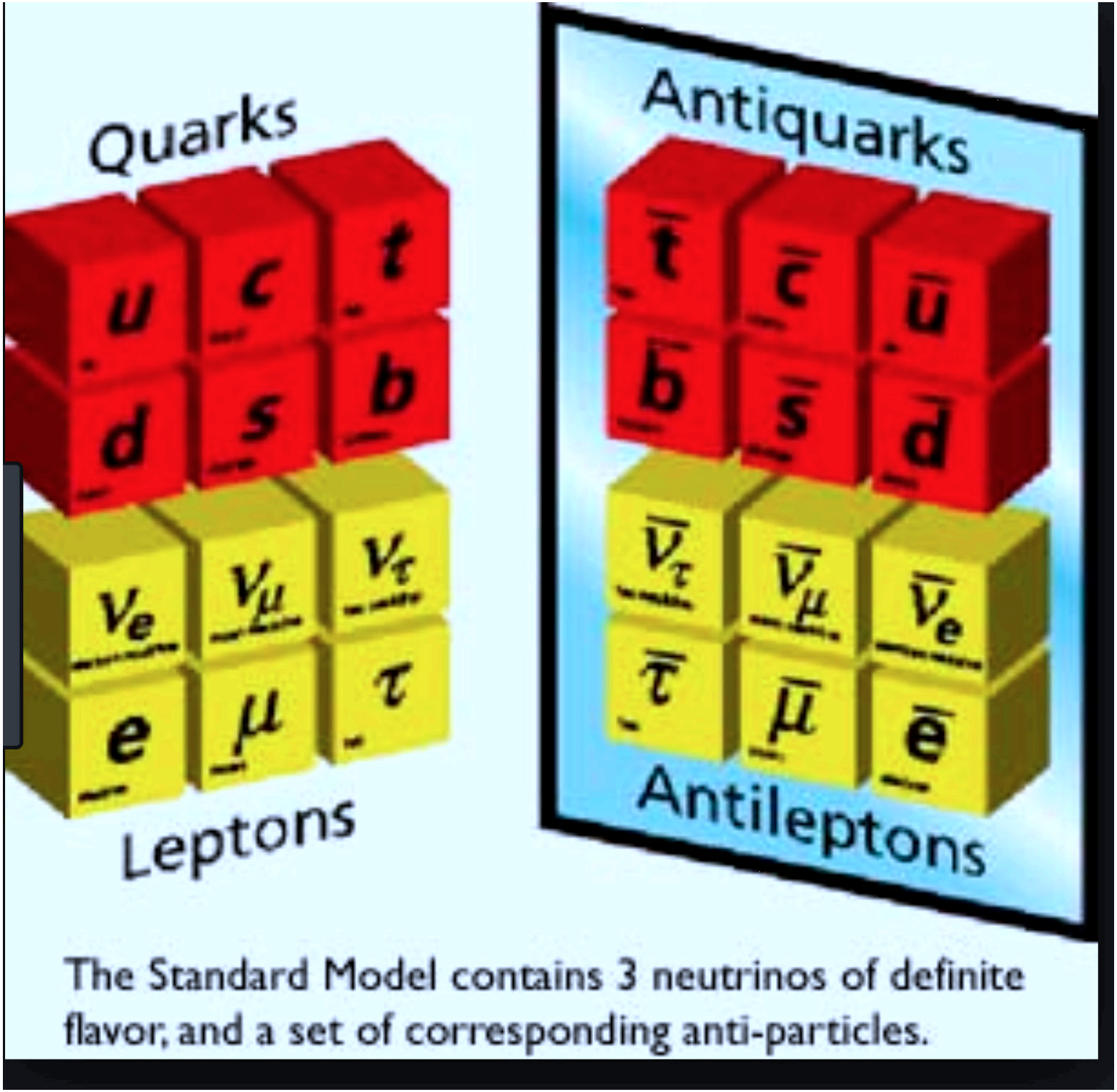




SUPER-KAMIOKANDE

- Human body = 20 mg of Potassium 40. Humans emit 340 million neutrinos per day!
- 100,000 billion pass through your body each second from the sun
  - **Your body will stop ~1 neutrino which passes through it in a lifetime!**


ATOM
PROBABILITY DISTRIBUTION
NUCLEUS
ELECTRONS
NUCLEUS
NEUTRONS
PROTONS
PROTON
QUARKS
u
u
d
Elementary Particles in the Standard Model
Fermions ("Matter")
u UP
c CHARM
t TOP
Quarks and Antiquarks
d DOWN
s STRANGE
b BOTTOM
Leptons and Antileptons
e ELECTRON
μ MUON
τ TAU
Bosons
γ PHOTON
g GLUON
Force-Carriers
Z⁰ WEAK FORCE
W± WEAK FORCE
h HIGGS



The Standard Model contains 3 neutrinos of definite flavor, and a set of corresponding anti-particles.

A **neutrino** (/nuːˈtriːnoʊ/ or /njuːˈtriːnoʊ/) (denoted by the Greek letter ν) is a fermion (an elementary particle with half-integer spin) that interacts only via the weak subatomic force and gravity.[2][3] The neutrino is so named because it is electrically neutral and because its rest mass is so small (*-ino*) that it was long thought to be zero. The mass of the neutrino is much smaller than that of the other known elementary particles.[1] The weak force has a very short range, the gravitational interaction is extremely weak, and neutrinos, as leptons, do not participate in the strong interaction. Thus, neutrinos typically pass through normal matter unimpeded and undetected.[2][3]

Weak interactions create neutrinos in one of three leptonic flavors: electron neutrinos (ν_e), muon neutrinos (ν_μ), or tau neutrinos (ν_τ), in association with the corresponding charged lepton.[4] Although neutrinos were long believed to be massless, it is now known that there are three discrete neutrino masses with different tiny values, but they do not correspond uniquely to the three flavors. A neutrino created with a specific flavor is in an associated specific quantum superposition of all three mass states. As a result, neutrinos oscillate between different flavors in flight. For example, an electron neutrino produced in a beta decay reaction may interact in a distant detector as a muon or tau neutrino.[5][6] Although only differences of squares of the three mass values are known as of 2016,[7] cosmological observations imply that the sum of the three masses must be less than one millionth that of the electron.[1][8]

For each neutrino, there also exists a corresponding antiparticle, called an *antineutrino*, which also has half-integer spin and no electric charge. They are distinguished from the neutrinos by having opposite signs of lepton number and chirality. To conserve total lepton number, in nuclear beta decay, electron neutrinos appear together with only positrons (anti-electrons) or electron-antineutrinos, and electron antineutrinos with electrons or electron neutrinos.[9][10]

Neutrinos are created by various radioactive decays, including in beta decay of atomic nuclei or hadrons, nuclear reactions such as those that take place in the core of a star or artificially in nuclear reactors, nuclear bombs or particle accelerators, during a supernova, in the spin-down of a neutron star, or when accelerated particle beams or cosmic rays strike atoms. The majority of neutrinos in the vicinity of the Earth are from nuclear reactions in the Sun. In the vicinity of the Earth, about 65 billion (6.5×10^{10}) solar neutrinos per second pass through every square centimeter perpendicular to the direction of the Sun.[11][12]

For study, neutrinos can be created artificially with nuclear reactors and particle accelerators. There is intense research activity involving neutrinos, with goals that include the determination of the three neutrino mass values, the measurement of the degree of CP violation in the leptonic sector (leading to leptogenesis); and searches for evidence of physics beyond the Standard Model of particle physics, such as neutrinoless double beta decay, which would be evidence for violation of lepton number conservation. Neutrinos can also be used for tomography of the interior of the earth.[13][14]

Contents [hide]

1 History
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- 1.2 Direct detection
- 1.3 Neutrino flavor
- 1.4 Solar neutrino problem
- 1.5 Oscillation
- 1.6 Cosmic neutrinos

2 Properties and reactions
- 2.1 Flavor, mass, and their mixing
- 2.2 Flavor oscillations
- 2.3 Mikheyev–Smirnov–Wolfenstein effect
- 2.4 Antineutrinos
- 2.5 Majorana mass
- 2.6 Nuclear reactions
- 2.7 Induced fission
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- 3.4 Sterile neutrino searches
- 3.5 Neutrinoless double-beta decay searches
- 3.6 Speed
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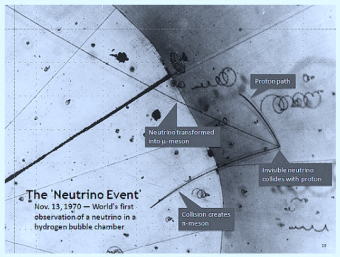
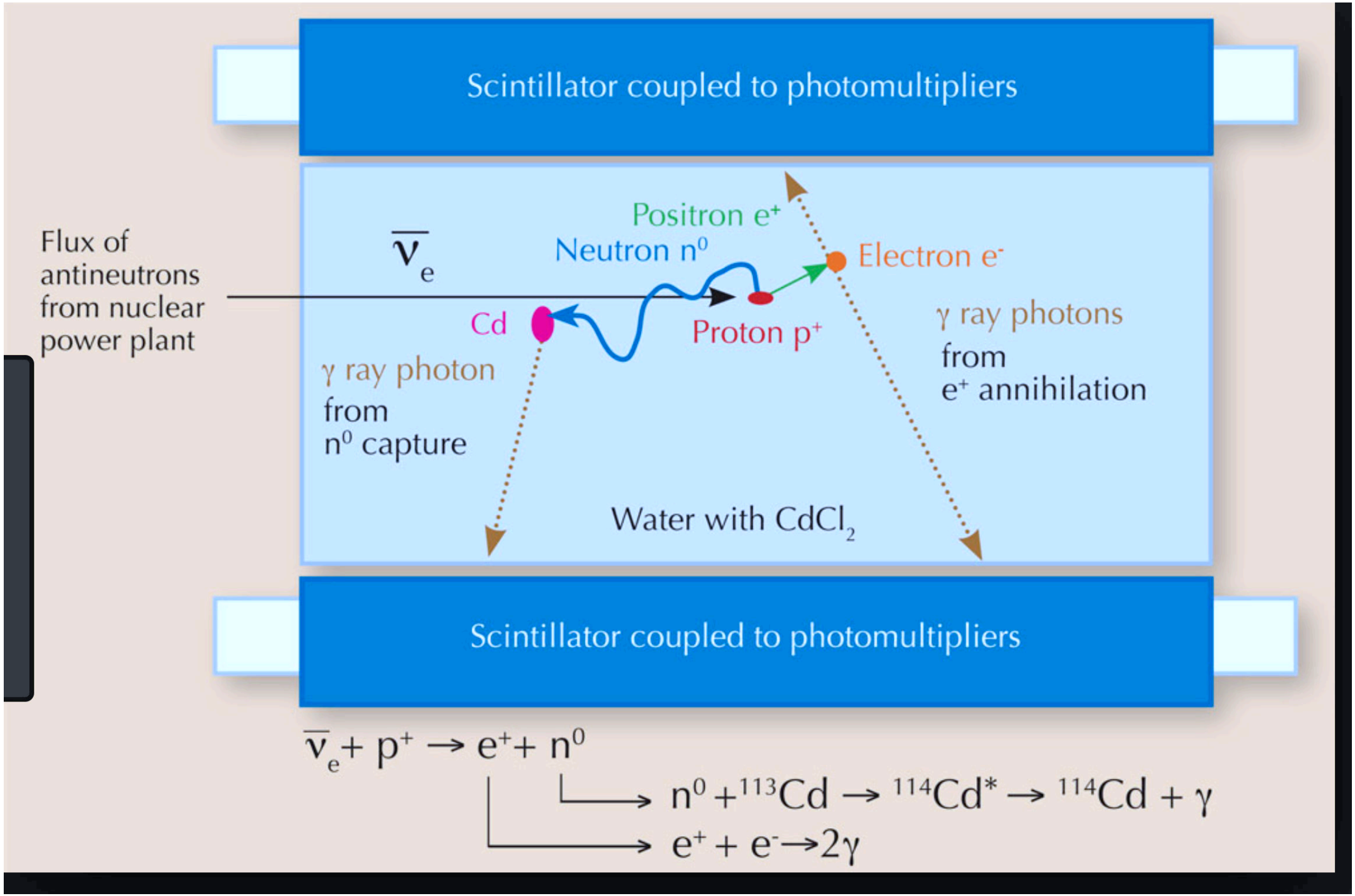
Neutrino/Antineutrino

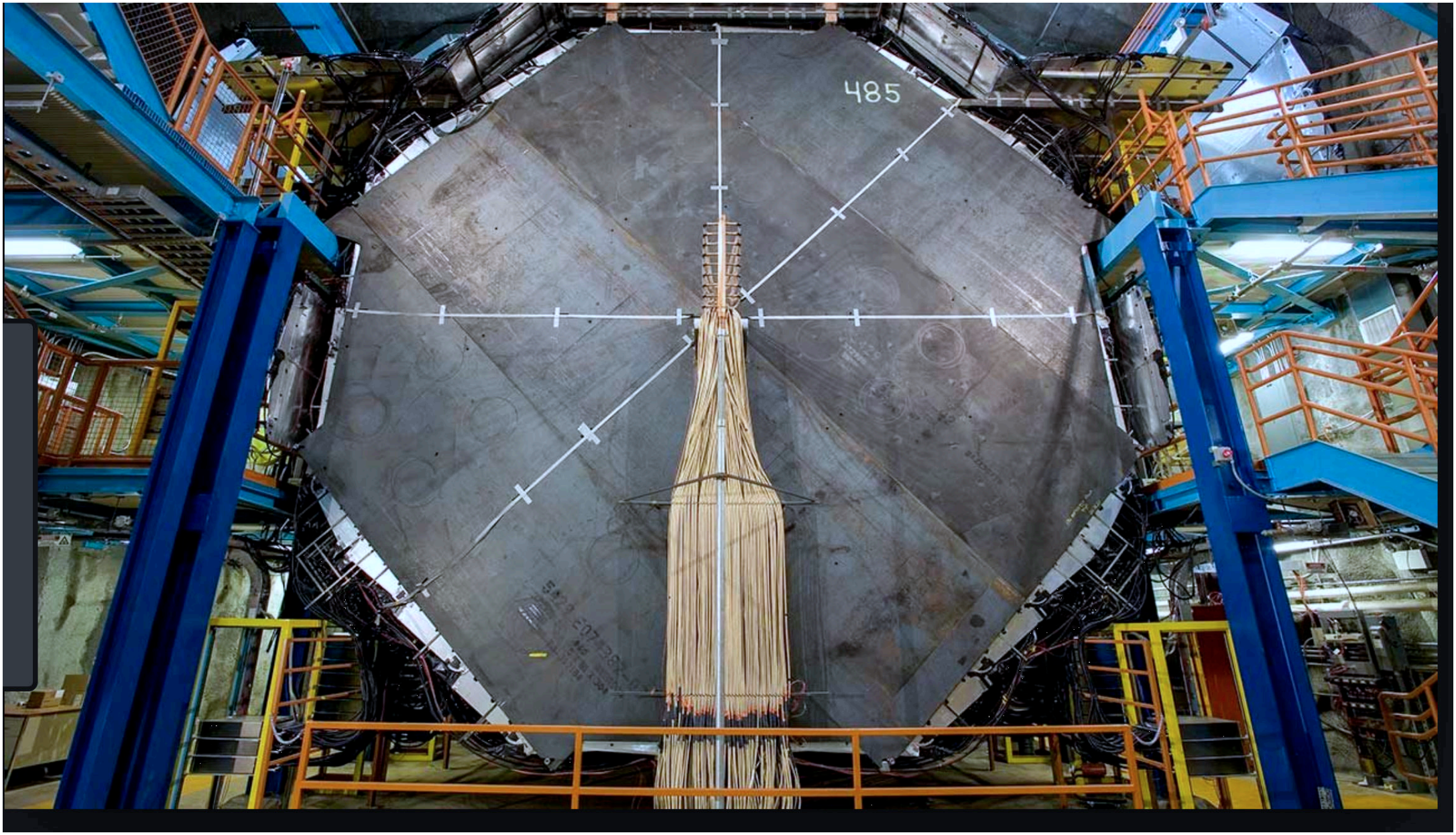


The first use of a hydrogen bubble chamber to detect neutrinos, on 13 November 1970, at Argonne National Laboratory. Here a neutrino hits a proton in a hydrogen atom; the collision occurs at the point where three tracks emanate on the right of the photograph.

Composition	Elementary particle
Statistics	Fermionic
Generation	First, second and third
Interactions	Weak interaction and gravitation
Symbol	ν_e, ν_μ, ν_τ, $\bar{\nu}_e$, $\bar{\nu}_\mu$, $\bar{\nu}_\tau$
Antiparticle	Opposite chirality from particle
Theorized	ν_e (Electron neutrino): Wolfgang Pauli (1930) ν_μ (Muon neutrino): Late 1940s ν_τ (Tau neutrino): Mid 1970s
Discovered	ν_e: Clyde Cowan, Frederick Reines (1956) ν_μ: Leon Lederman, Melvin Schwartz and Jack Steinberger (1962) ν_τ: DONUT collaboration (2000)
Types	3 – electron neutrino, muon neutrino and tau neutrino
Mass	≤ 0.120 eV/c^2 (95% confidence level, sum of 3 flavors)[1]
Electric charge	0 *e*
Spin	$\frac{1}{2}$
Weak isospin	LH: $+\frac{1}{2}$, RH: 0
Weak hypercharge	LH: −1, RH: 0
B* − *L	−1
X	−3

ICE CUBE


Scintillator coupled to photomultipliers
Flux of antineutrons from nuclear power plant
$\overline{\nu}_e$
Positron e^+
Neutron n^0
Electron e^-
Cd
Proton p^+
γ ray photons from e^+ annihilation
γ ray photon from n^0 capture
Water with $CdCl_2$
Scintillator coupled to photomultipliers
$\overline{\nu}_e + p^+ \rightarrow e^+ + n^0$
$n^0 + {}^{113}Cd \rightarrow {}^{114}Cd^* \rightarrow {}^{114}Cd + \gamma$
$e^+ + e^- \rightarrow 2\gamma$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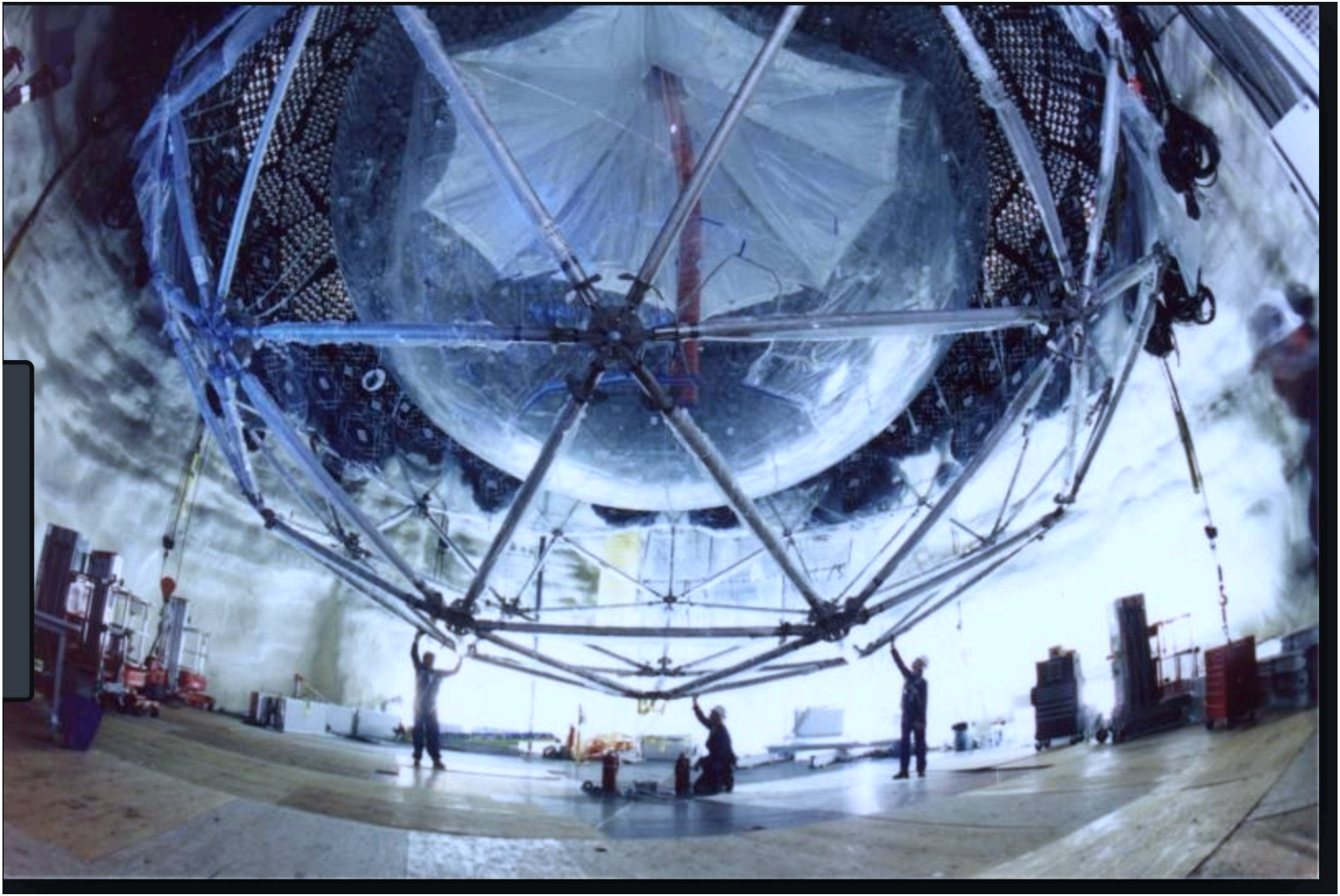
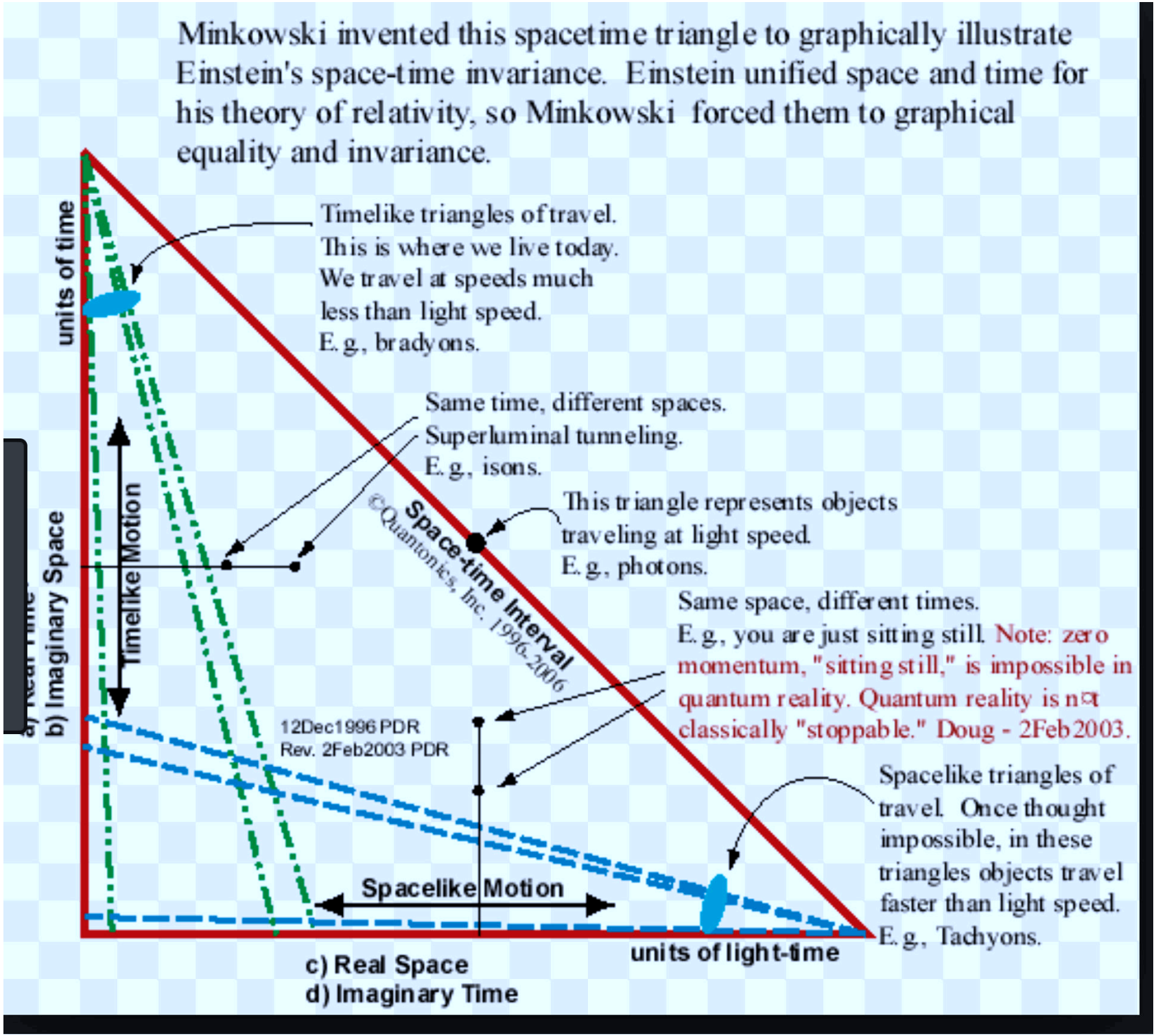
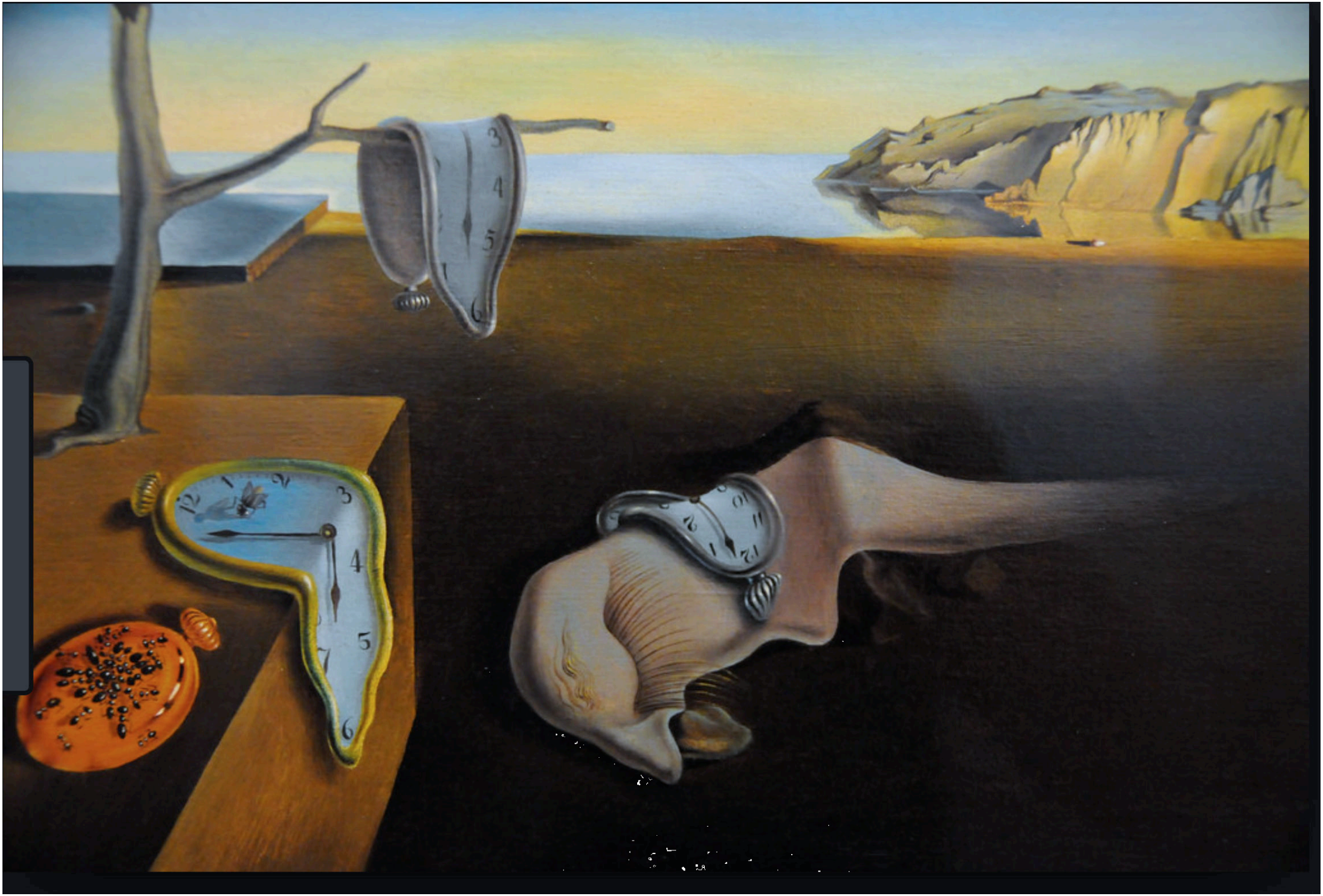
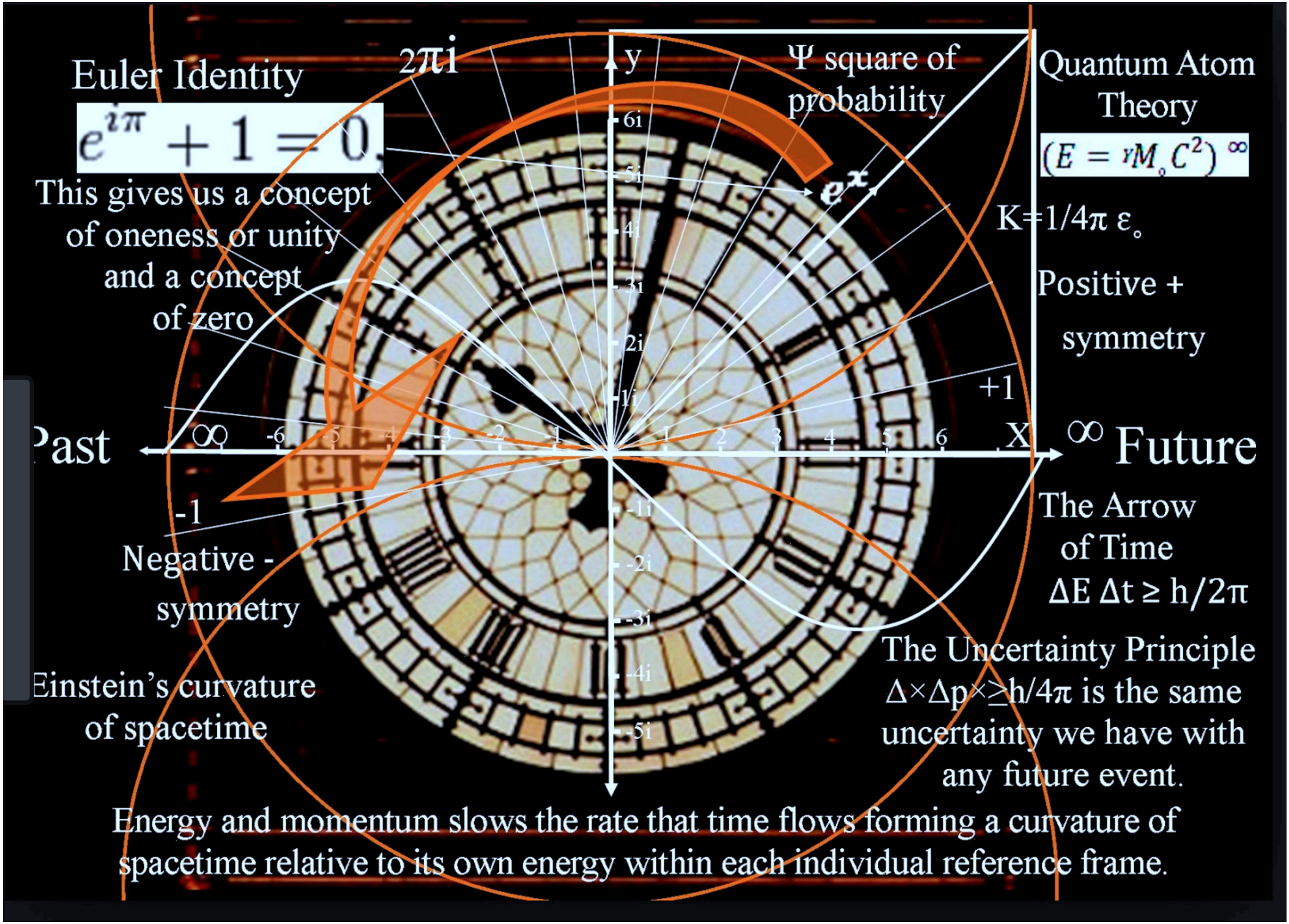



Minkowski invented this spacetime triangle to graphically illustrate Einstein's space-time invariance. Einstein unified space and time for his theory of relativity, so Minkowski forced them to graphical equality and invariance.
units of time
Timelike triangles of travel.
This is where we live today.
We travel at speeds much
less than light speed.
E.g., bradyons.
Same time, different spaces.
Superluminal tunneling.
E.g., isons.
This triangle represents objects
traveling at light speed.
E.g., photons.
Space-time Interval
©Quantonics, Inc. 1996-2006
Timelike Motion
b) Imaginary Space
Same space, different times.
E.g., you are just sitting still. Note: zero momentum, "sitting still," is impossible in quantum reality. Quantum reality is not classically "stoppable." Doug - 2Feb2003.
12Dec1996 PDR
Rev. 2Feb2003 PDR
Spacelike triangles of
travel. Once thought
impossible, in these
triangles objects travel
faster than light speed.
E.g., Tachyons.
Spacelike Motion
units of light-time
c) Real Space
d) Imaginary Time



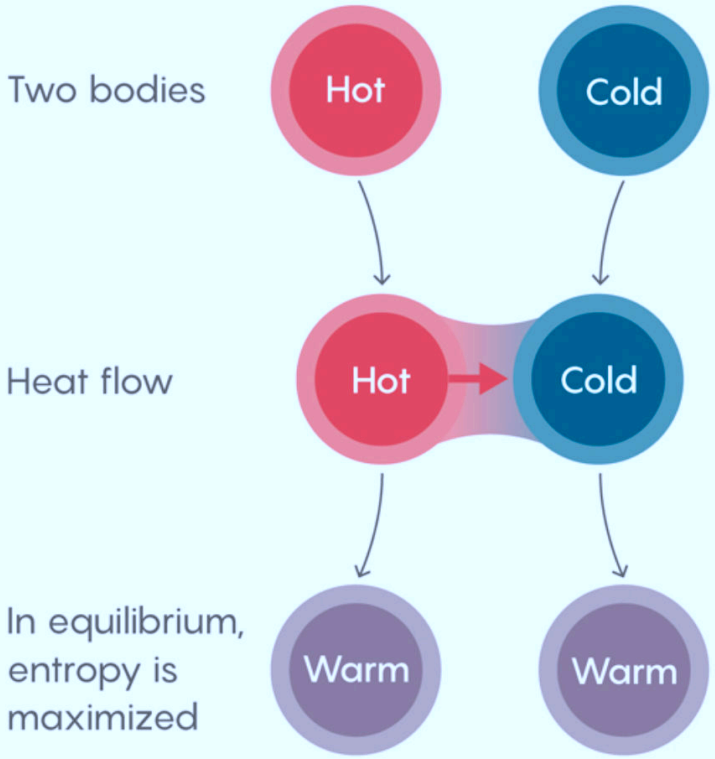

Euler Identity
$e^{i\pi} + 1 = 0,$
This gives us a concept of oneness or unity and a concept of zero
2πi
y
Ψ square of probability
Quantum Atom Theory
$(E = \gamma M_o C^2)^{\infty}$
e^x
K=1/4π ε₀
Positive + symmetry
+1
Past
∞
-6
-5
-4
-3
-2
-1
1
2
3
4
5
6
X
∞
Future
-1
Negative - symmetry
The Arrow of Time
ΔE Δt ≥ h/2π
Einstein's curvature of spacetime
The Uncertainty Principle
Δ×Δp×≥h/4π is the same uncertainty we have with any future event.
Energy and momentum slows the rate that time flows forming a curvature of spacetime relative to its own energy within each individual reference frame.

How to Reverse the Thermodynamic Arrow of Time

Heat flows from hot to cold because this increases the entropy (or disorder) of the system, in accordance with the second law of thermodynamics. Yet a recent experiment showed how quantum correlations can seem to toy with this principle.

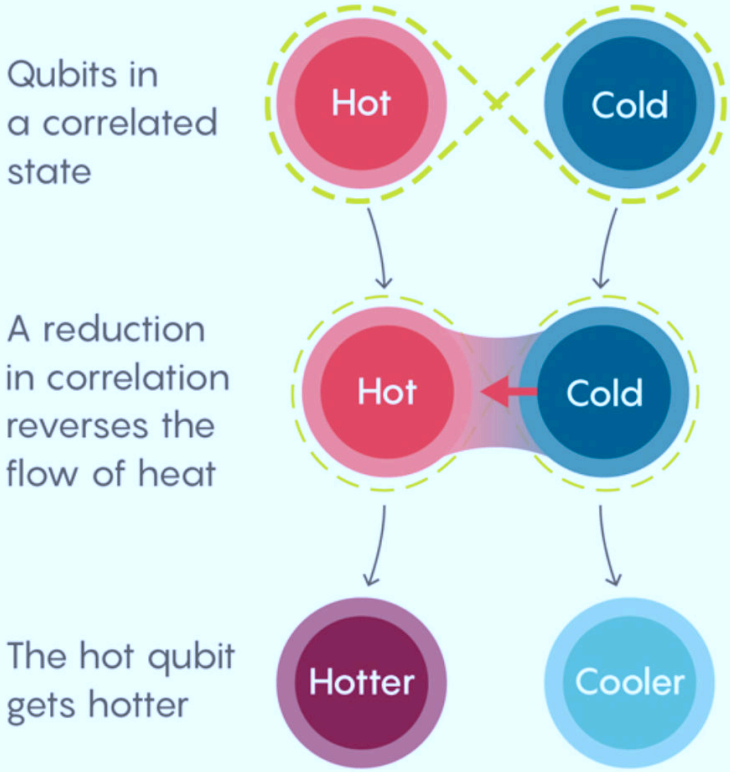
Classical System

In an uncorrelated or classical system, heat will always flow from hot to cold.

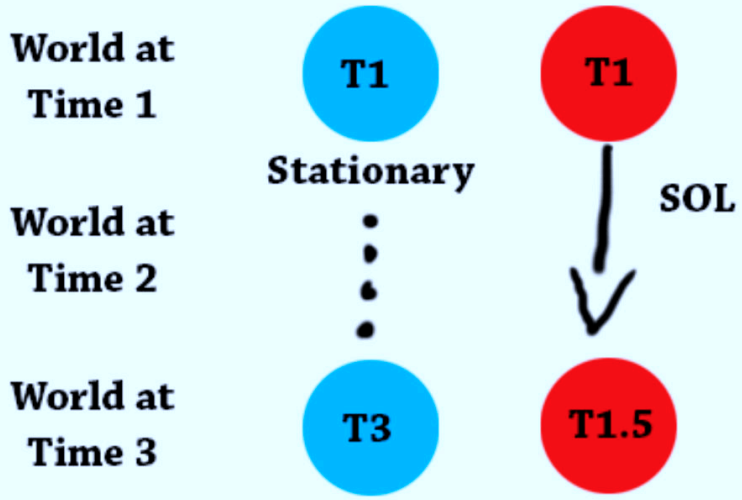


Quantum System

Correlations between qubits can affect the way that entropy is calculated.



Quantum Teleportation + Time Dilation = Time Travel?



Given two entangled particles, send 1 forward at the SOL.

Near SOL time dilation kicks in and time passes more slowly for the red particle than the blue.

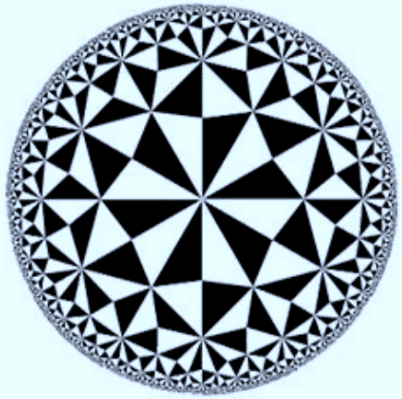
Time passes for the blue particle normally. When the red particle stops traveling, time around it will have passed much faster.

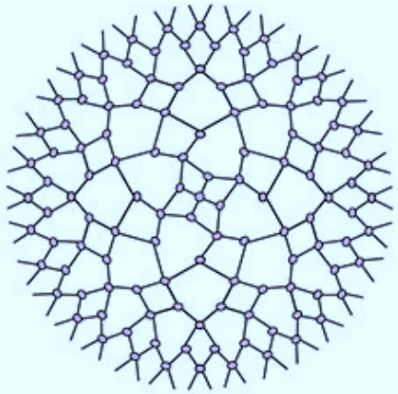
While the same amount of time has passed for both entangled particles, one particle will end up entangled with a particle from the past.

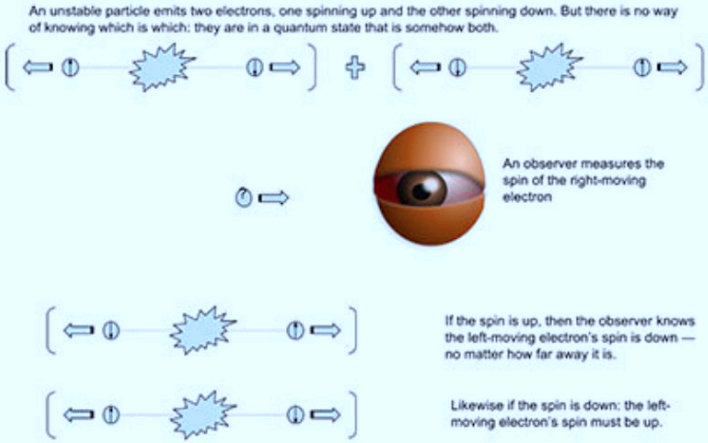
Can you use quantum teleportation to send information about the red particle back in time to the blue particle and will someone in the past see it pop out the other end?

Part 1

A hyperbolic tesselation diagram and a tensor network; and a basic explanation of quantum entanglement (editor sketch)

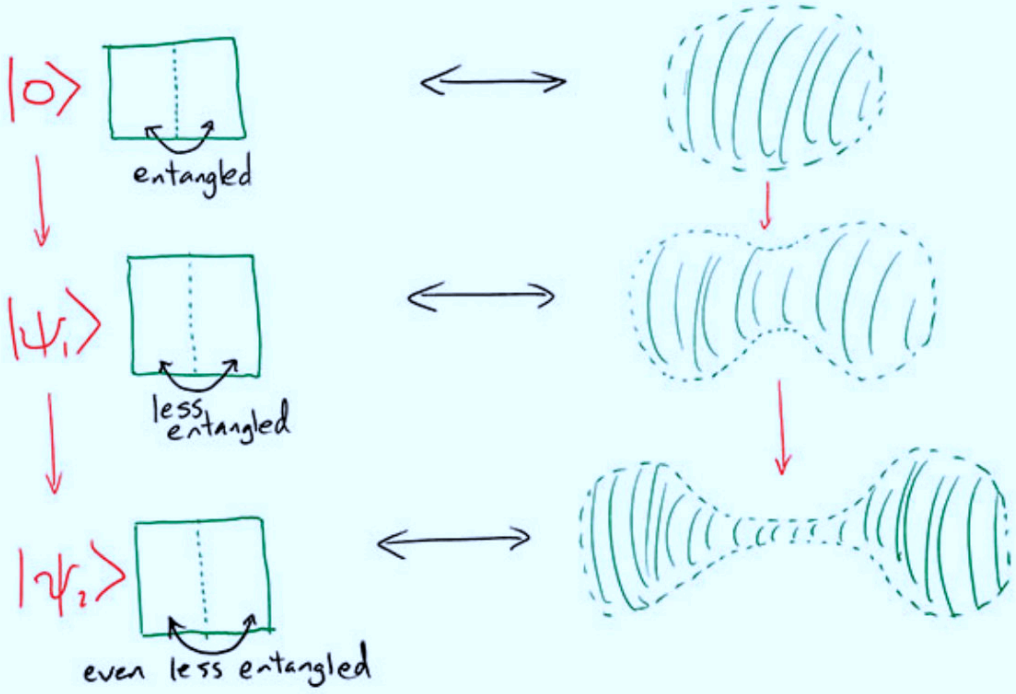






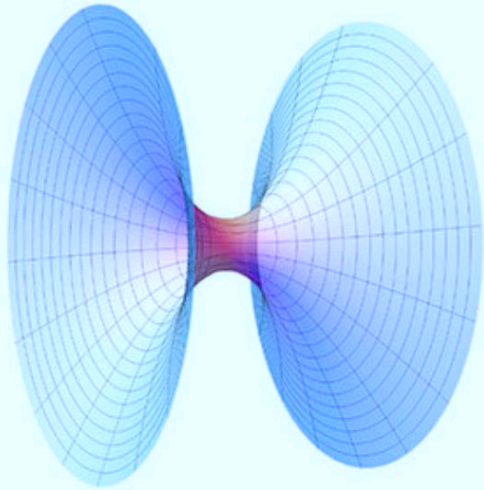
Part 2

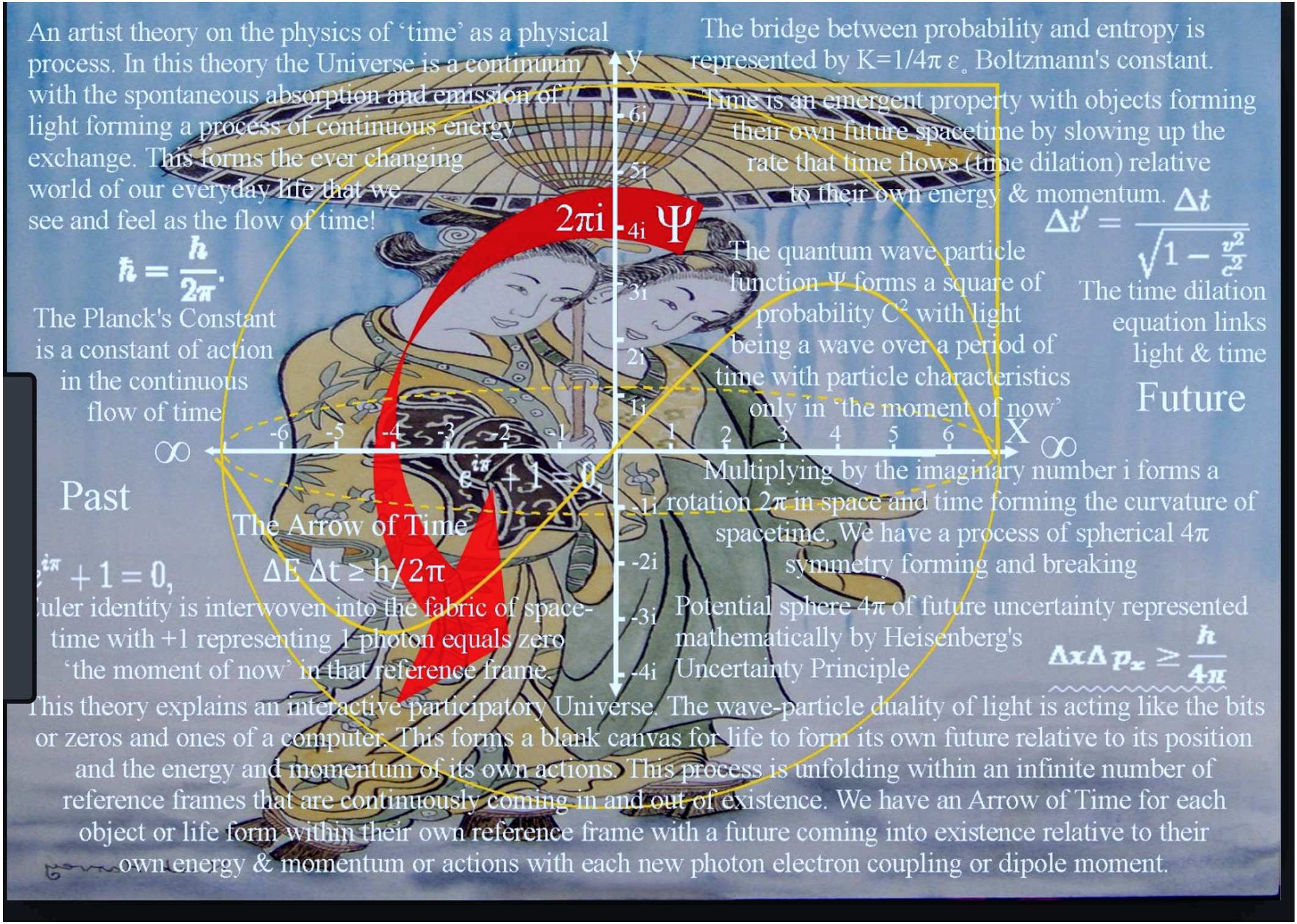
Sketch by Van Raamsdonk showing how entanglement is linked to space time

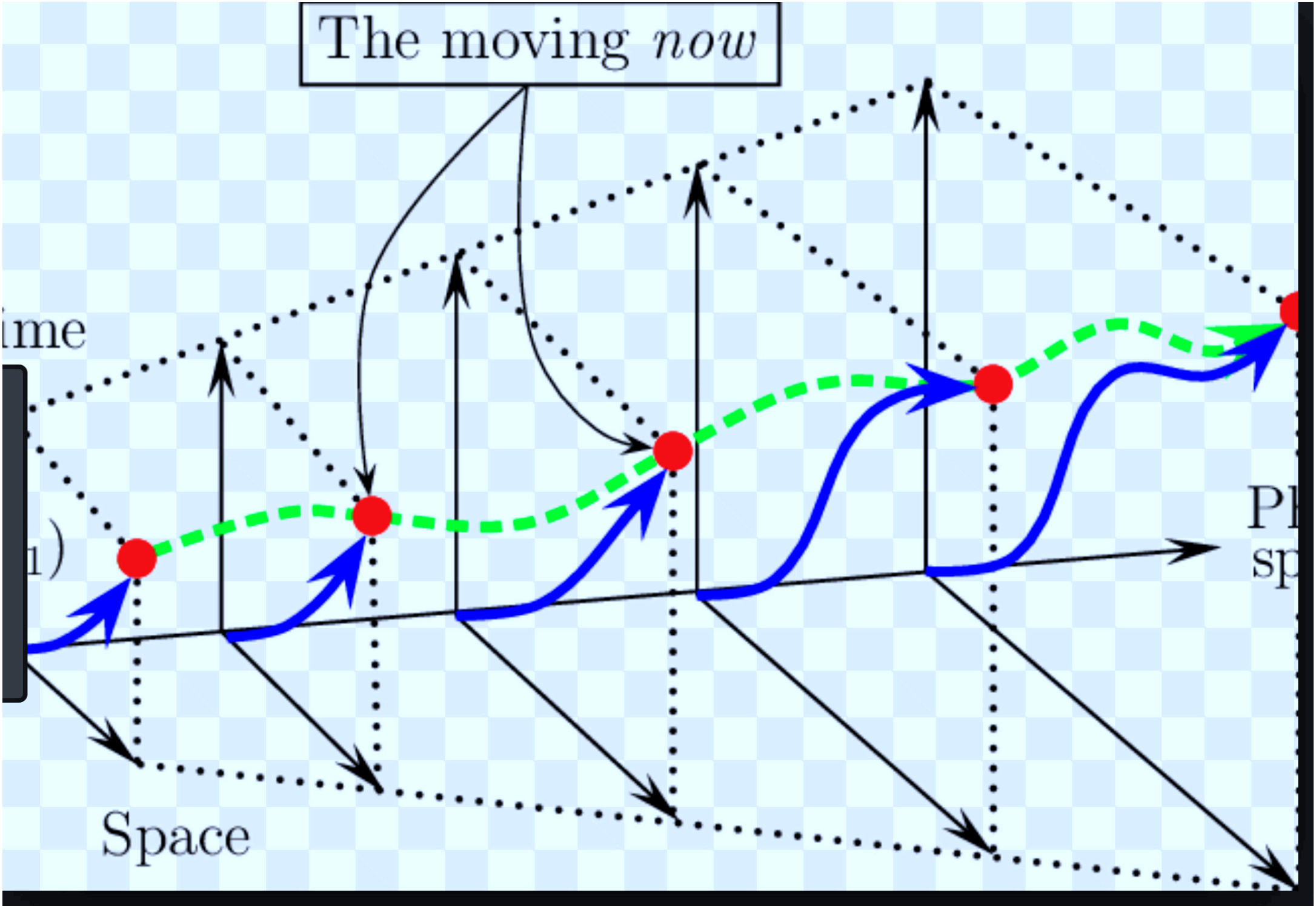


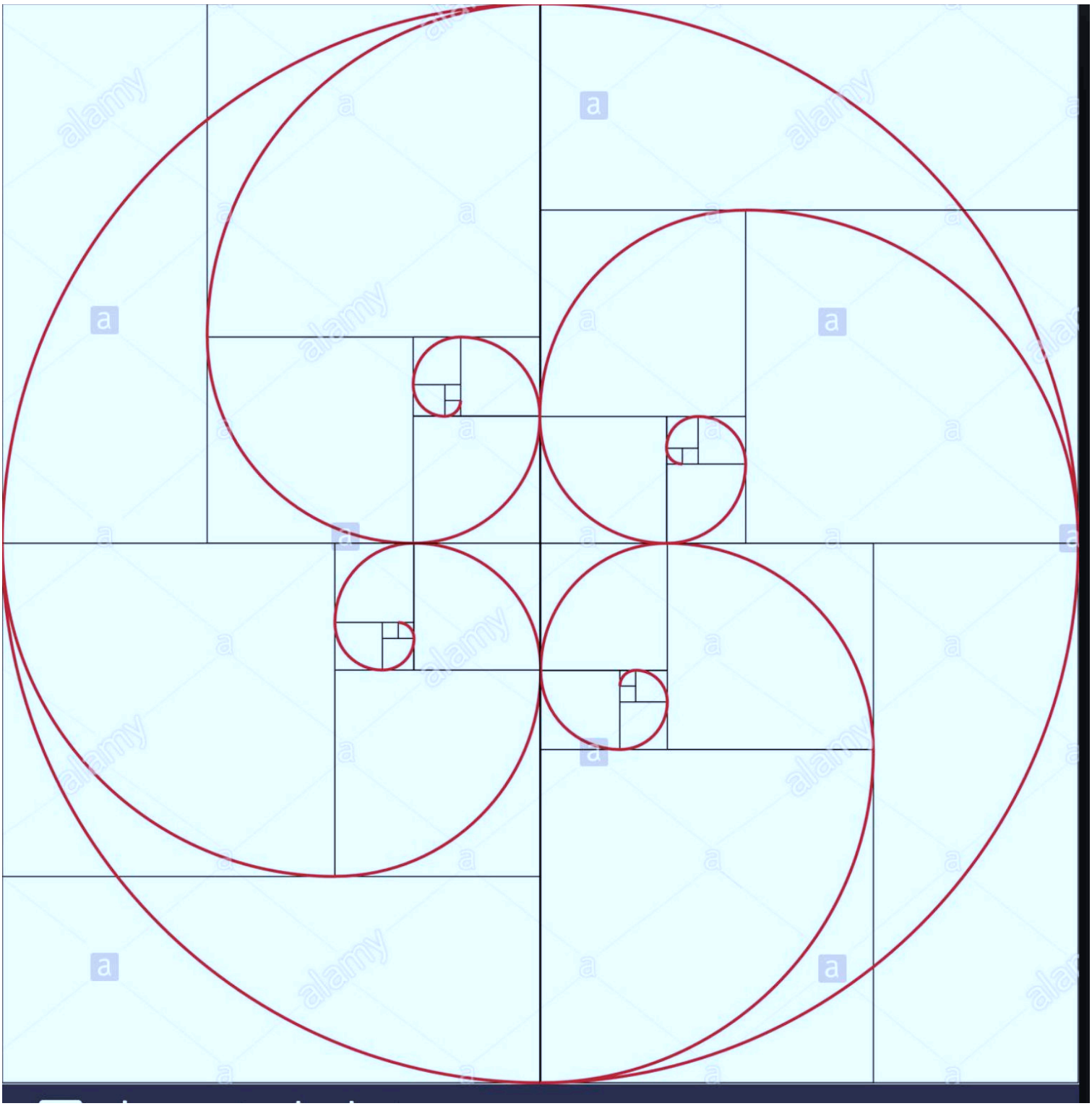
Part 3

File image of wormhole



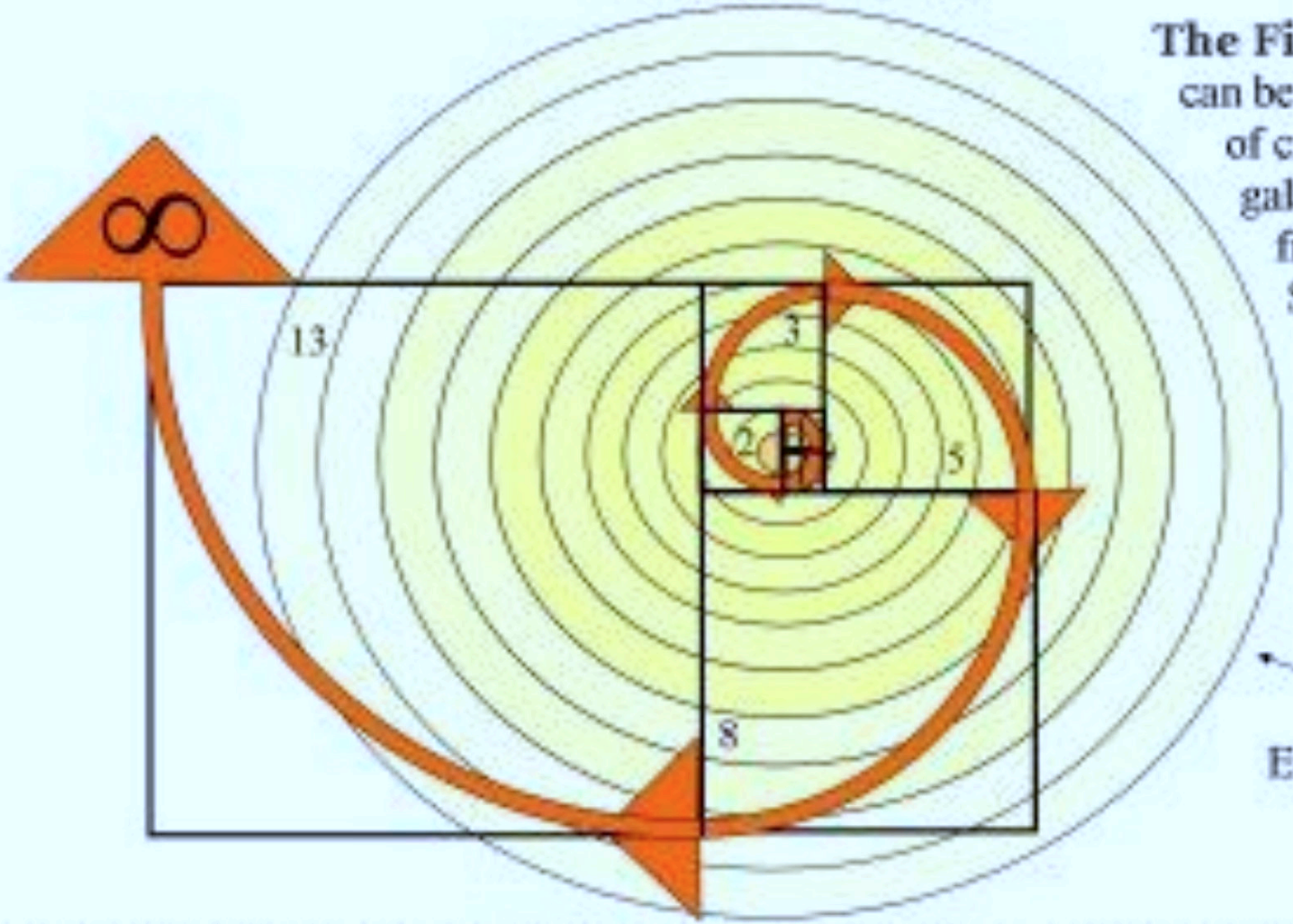

An artist theory on the physics of 'time' as a physical process. In this theory the Universe is a continuum with the spontaneous absorption and emission of light forming a process of continuous energy exchange. This forms the ever changing world of our everyday life that we see and feel as the flow of time!
$\hbar = \frac{h}{2\pi}$.
The Planck's Constant is a constant of action in the continuous flow of time
The bridge between probability and entropy is represented by K=1/4π ε₀ Boltzmann's constant.
Time is an emergent property with objects forming their own future spacetime by slowing up the rate that time flows (time dilation) relative to their own energy & momentum.
$\Delta t' = \frac{\Delta t}{\sqrt{1 - \frac{v^2}{c^2}}}$
The time dilation equation links light & time
The quantum wave particle function Ψ forms a square of probability C^2 with light being a wave over a period of time with particle characteristics only in 'the moment of now'
Future
Past
y
6i
5i
4i
3i
2i
1i
-1i
-2i
-3i
-4i
2πi
Ψ
-6 -5 -4 -3 -2 -1
1 2 3 4 5 6
X
∞
∞
$e^{i\pi} + 1 = 0$,
The Arrow of Time
$\Delta E \, \Delta t \geq h/2\pi$
Multiplying by the imaginary number i forms a rotation 2π in space and time forming the curvature of spacetime. We have a process of spherical 4π symmetry forming and breaking
$e^{i\pi} + 1 = 0$,
Euler identity is interwoven into the fabric of space-time with +1 representing 1 photon equals zero 'the moment of now' in that reference frame.
Potential sphere 4π of future uncertainty represented mathematically by Heisenberg's Uncertainty Principle
$\Delta x \Delta p_x \geq \frac{h}{4\pi}$
This theory explains an interactive participatory Universe. The wave-particle duality of light is acting like the bits or zeros and ones of a computer. This forms a blank canvas for life to form its own future relative to its position and the energy and momentum of its own actions. This process is unfolding within an infinite number of reference frames that are continuously coming in and out of existence. We have an Arrow of Time for each object or life form within their own reference frame with a future coming into existence relative to their own energy & momentum or actions with each new photon electron coupling or dipole moment.


The moving *now*
ime
1)
Space



Quantum Atom Theory

Fibonacci Spiral



The Fibonacci sequence can be found on every level of creation from spiral galaxies to sea shells from the rings of Saturn to living cells.

Einstein's curvature of spacetime.

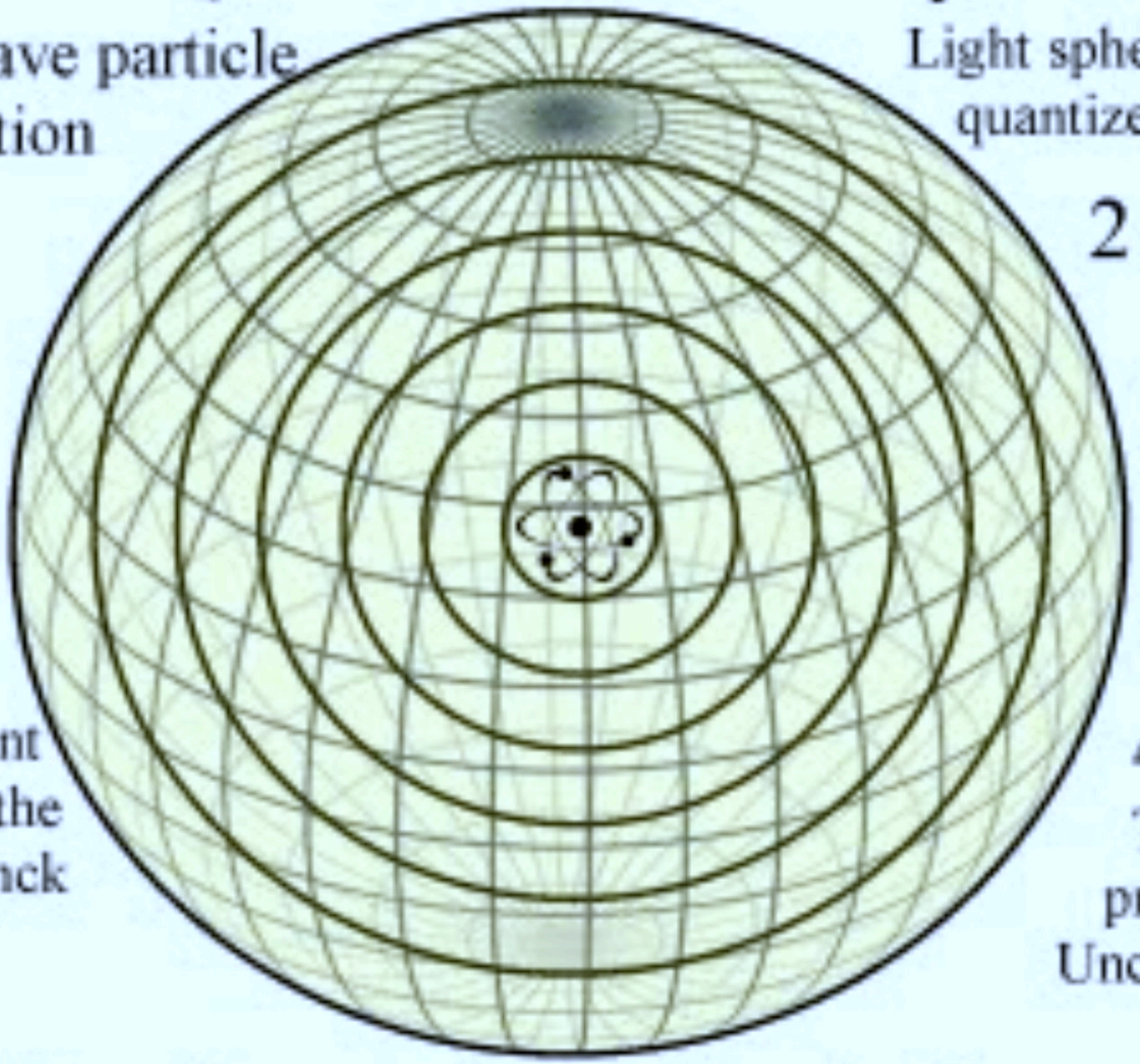
Each atom will radiate out light sphere of quantized wave fronts creating the geometry of spacetime. The observer will feel this process as the forward momentum of time. When the universal symmetry of spacetime is broken we get the symmetry that we observe in nature.

Quantum Atom Theory

Ψ Quantum wave particle function

Light sphere of expanding quantized wave fronts

2π



$\hbar = \frac{h}{2\pi}$.

Each wave front is quantized at the level of the Planck constant

$\Delta x \, \Delta p \geq \frac{1}{2}\hbar$

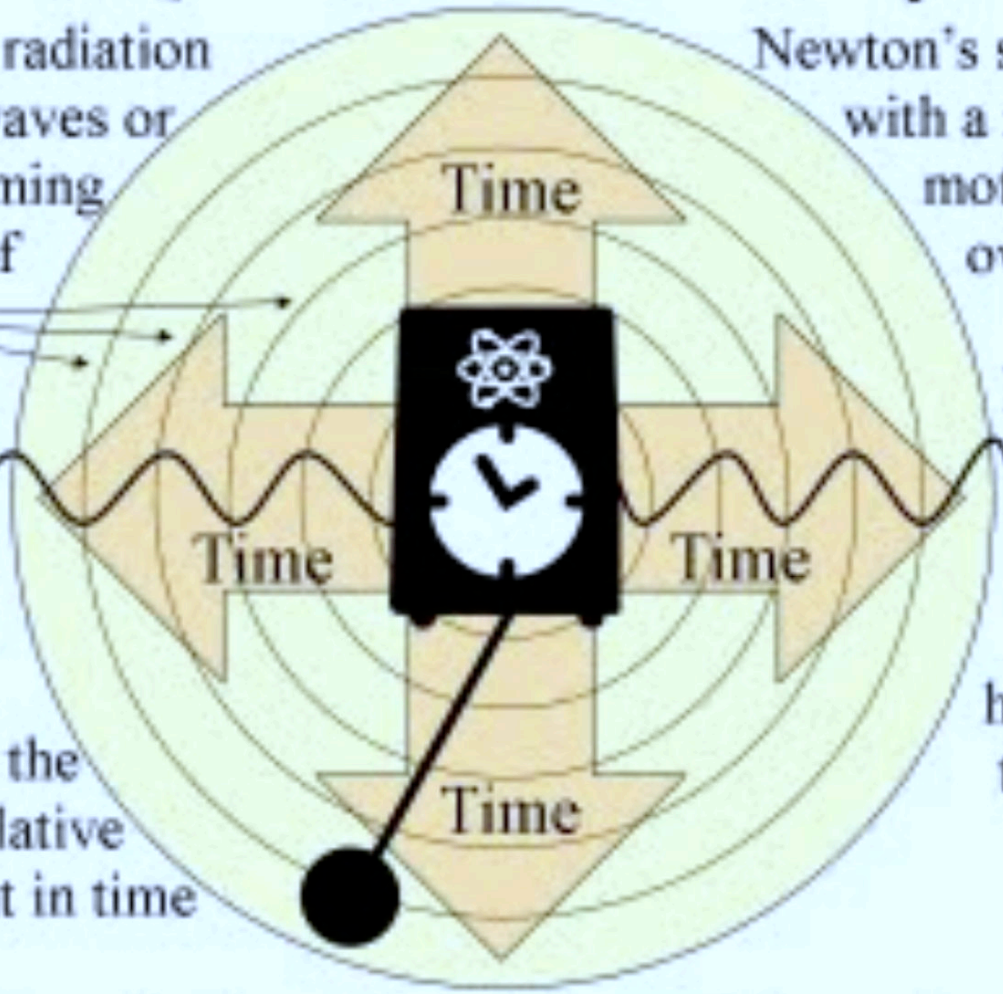
The expanding probability of the Uncertainty Principle

When there is a photon electron coupling two dimensional space on the surface of an atom expands into three dimensional spacetime. Even the individual atoms of the observer are creating their own spacetime geometry.

Quantum Atom Theory

Electromagnet radiation of sinusoidal waves or sine waves forming the curvature of spacetime

Newton's second law F=MA combined with a restoring force leads to a motion that repeats itself over equal periods of time producing Harmonic Motion.



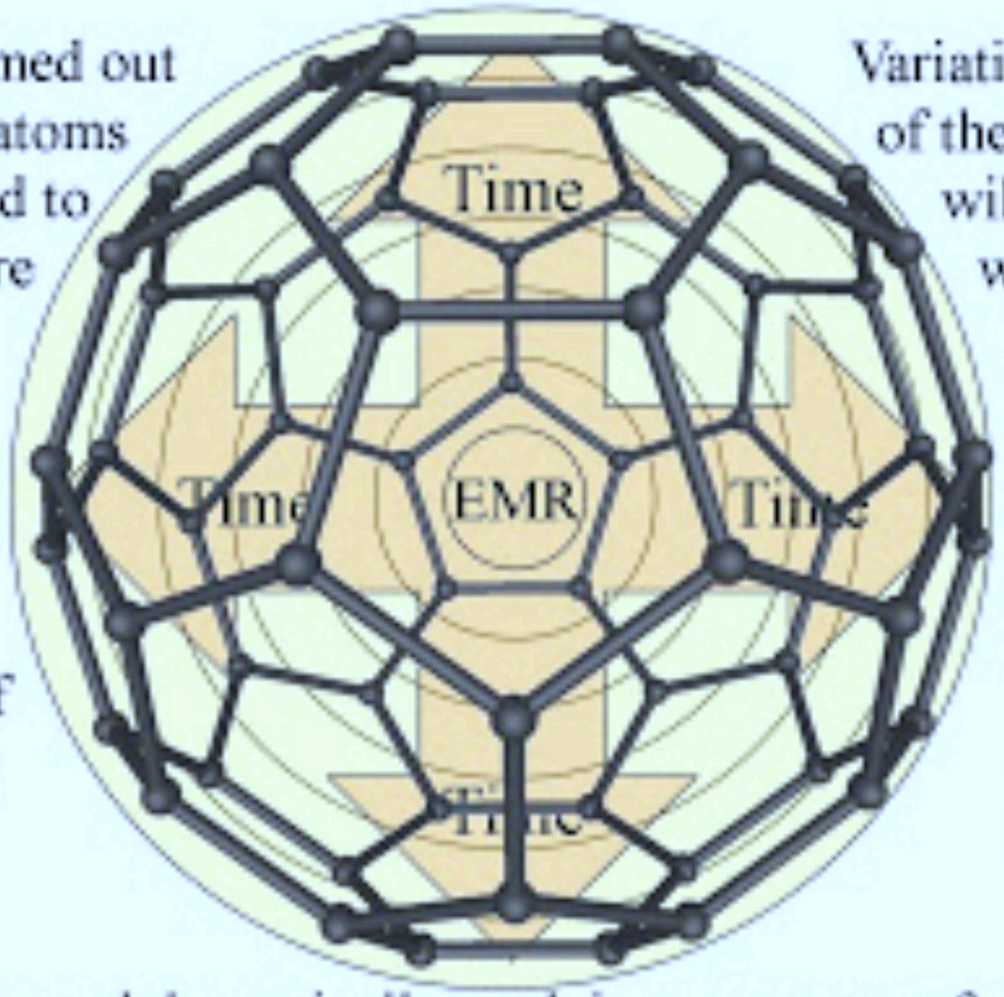
pacetime is uantized into noments, only the requency is relative t each moment in time

A pendulum mimics harmonic motion always taking exactly the same amount of time

The harmonic periodic motion of time can be seen in mathematics in recurring decimal if we take a fraction of the pendulum swing, say 3/11 and convert to the recurring decimal 0.272 727 272 727 272 727 272 727 272 ∞ The simple harmonic pattern can be seen

Quantum Atom Theory

C60 molecule formed out of sixty carbon atoms equally placed to form a sphere



Variations in the temperature of the objects environment will lead to harmonic waves of different frequencies.

$$E=hf$$

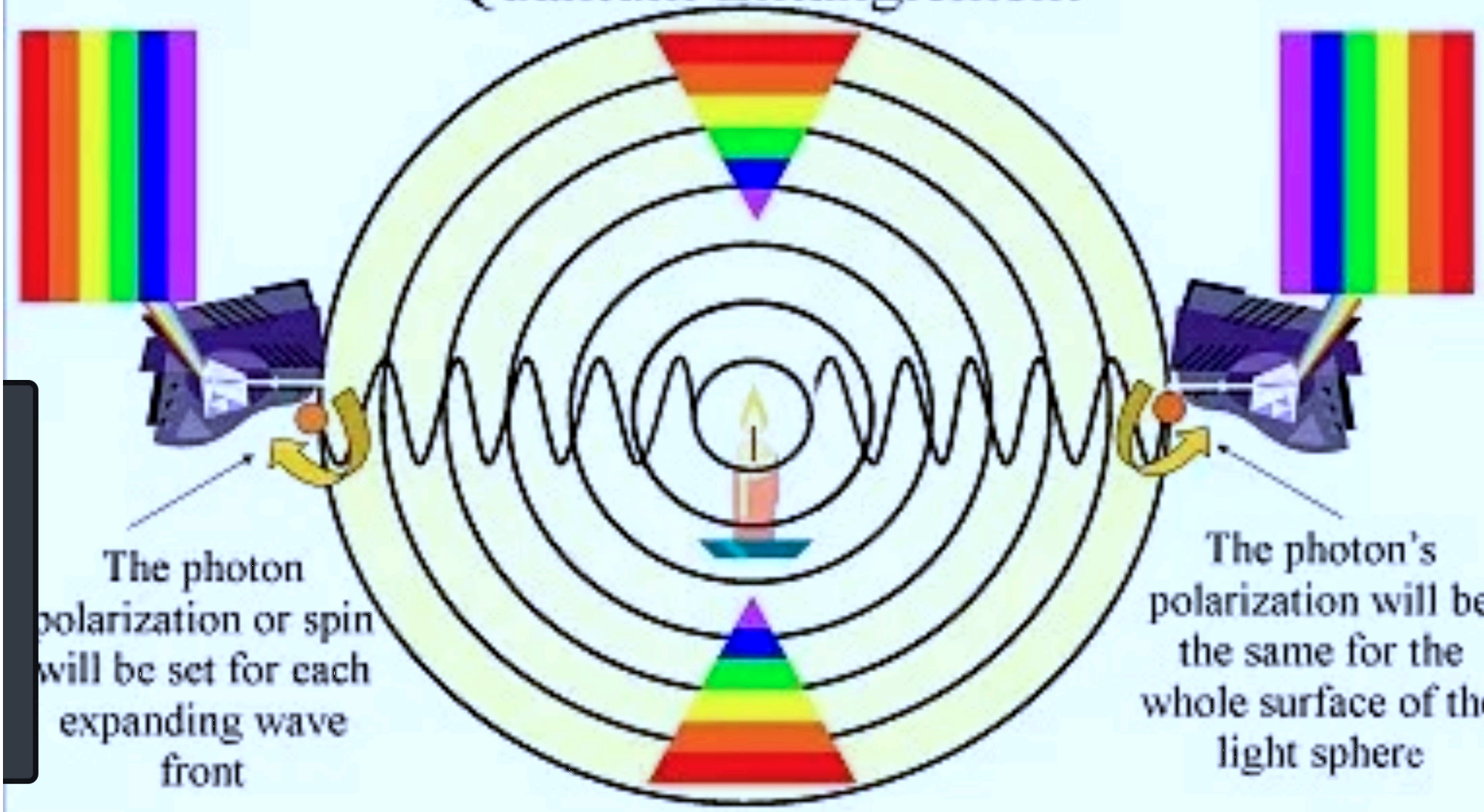
$$p = h/\lambda,$$

The momentum of EMR forms the symmetry of time

C60 forms naturally by heating graphite

We have a universal dynamically evolving geometry of spacetime forming symmetry from simple dynamics. The forward momentum of EMR will place like-charged particles that repel becoming equally spaced along the curvature of spacetime.

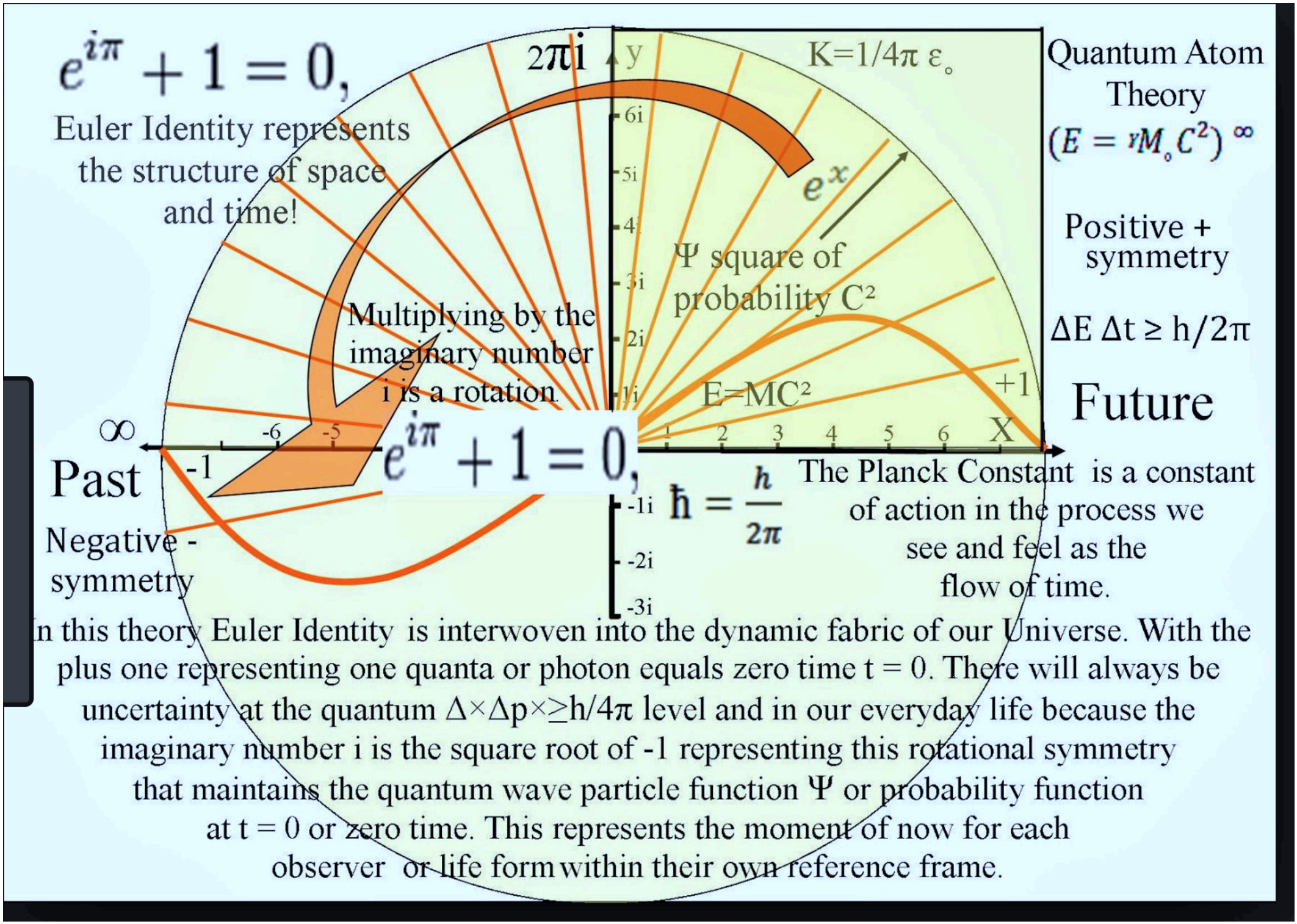
Quantum Entanglement



The photon polarization or spin will be set for each expanding wave front

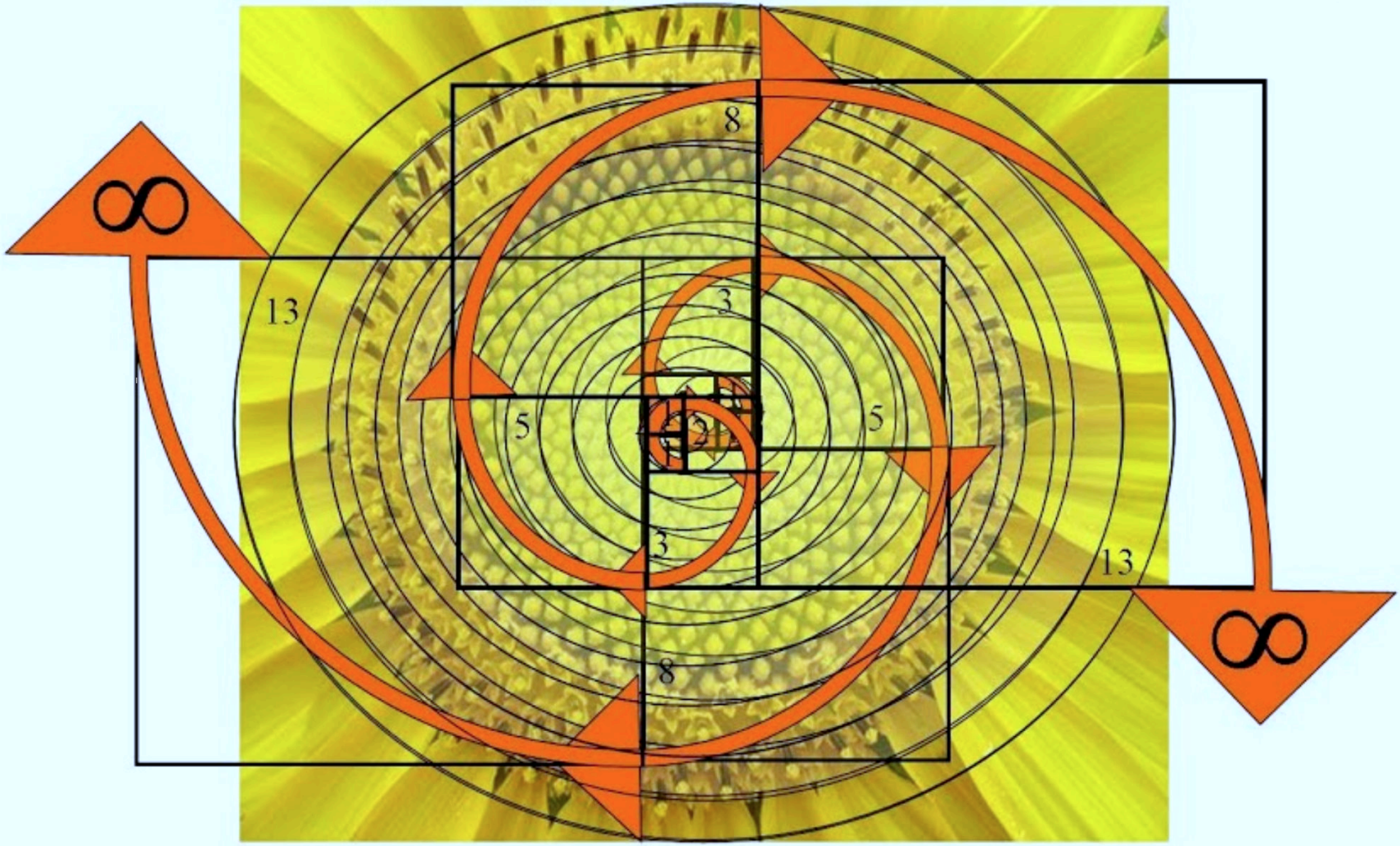
The photon's polarization will be the same for the whole surface of the light sphere

In Quantum Atom Theory light has spherical symmetry and geometry that can explain quantum entanglement. The different wavelength (colours) will only be relative to each other and the source of the light



In this theory Euler Identity is interwoven into the dynamic fabric of our Universe. With the plus one representing one quanta or photon equals zero time t = 0. There will always be uncertainty at the quantum $\Delta \times \Delta p \times \geq h/4\pi$ level and in our everyday life because the imaginary number i is the square root of -1 representing this rotational symmetry that maintains the quantum wave particle function Ψ or probability function at t = 0 or zero time. This represents the moment of now for each observer or life form within their own reference frame.

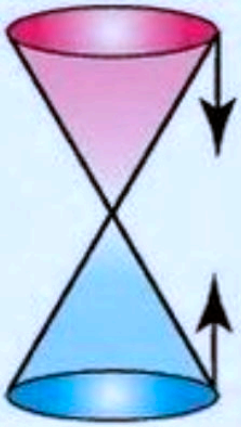
Fibonacci Spiral patterns within a flower head



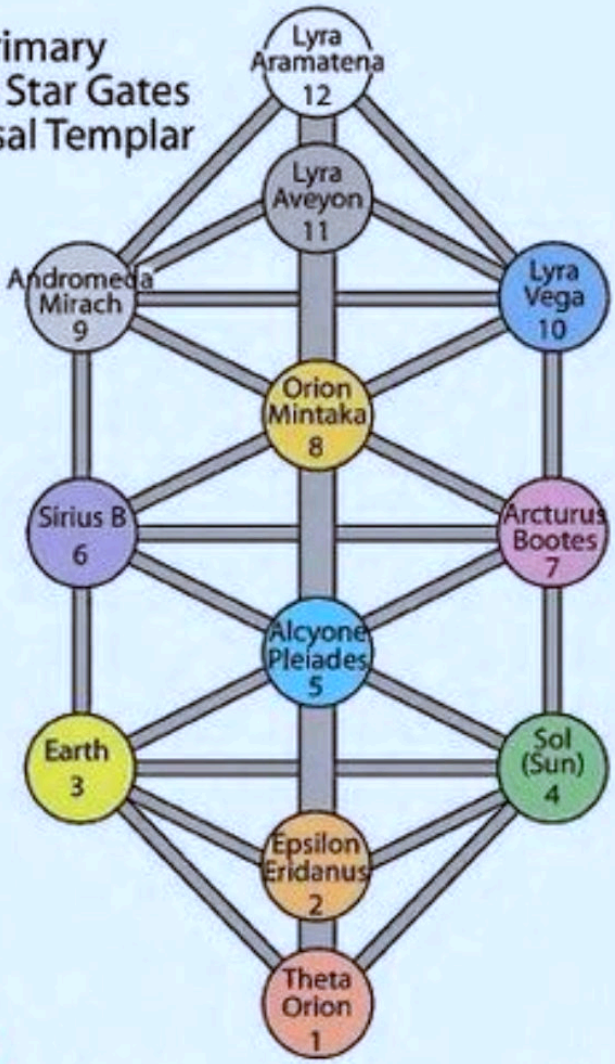
The same broken symmetry can be see in each individual part of a plant from the position of the leaves to the petals and seeds upon the flower head. Each new cell growth will have its own unique angle forming the curvature of spacetime. This will break the spherical symmetry of EMR or light forming spiral patterns.

Portals and Star Gates

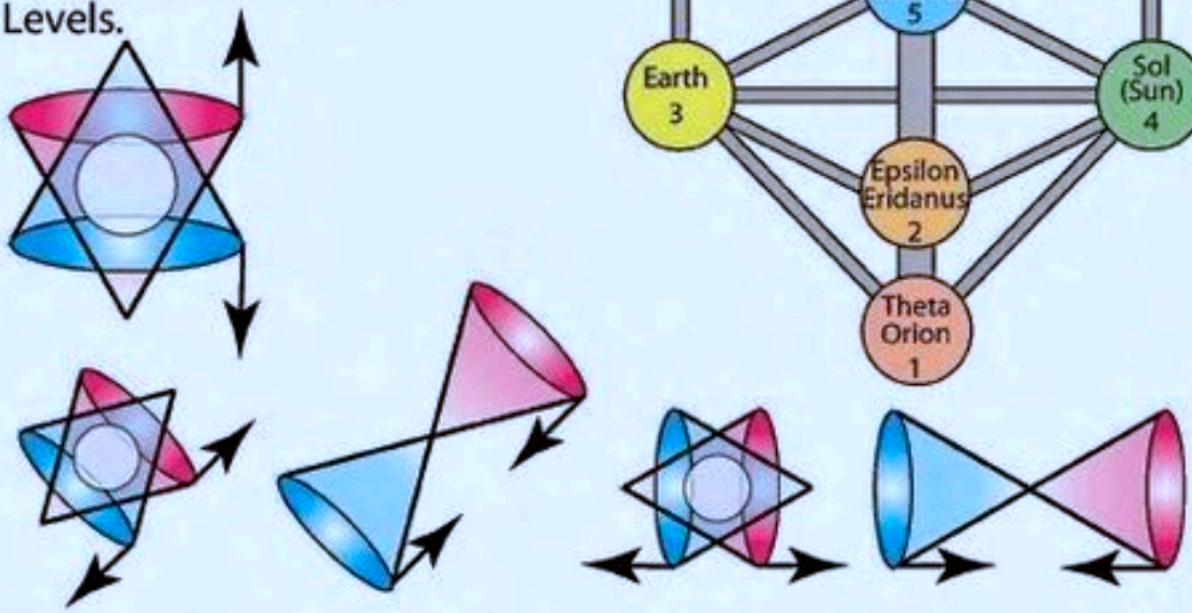
When Star Gates and Portals activate, the counter-rotating electromagnetic spiral pair merges to form a Merkaba Vehicle, its center becomes a "Form Constant" Still Point that links various Space-time locations directly to each other, creating a trans-time bridge.



12 Primary Universal Star Gates of Universal Templar



Vertical Axis spiral pairs form the Star Gates of the Dimensional Lock System, which permit passage between space-time locations in multiple Universes and Density Levels.



Horizontal and Diagonal Axis spiral pairs form the Portals of the Time Portal System, which permit passage between space-time locations in one Universe and One Density Level.

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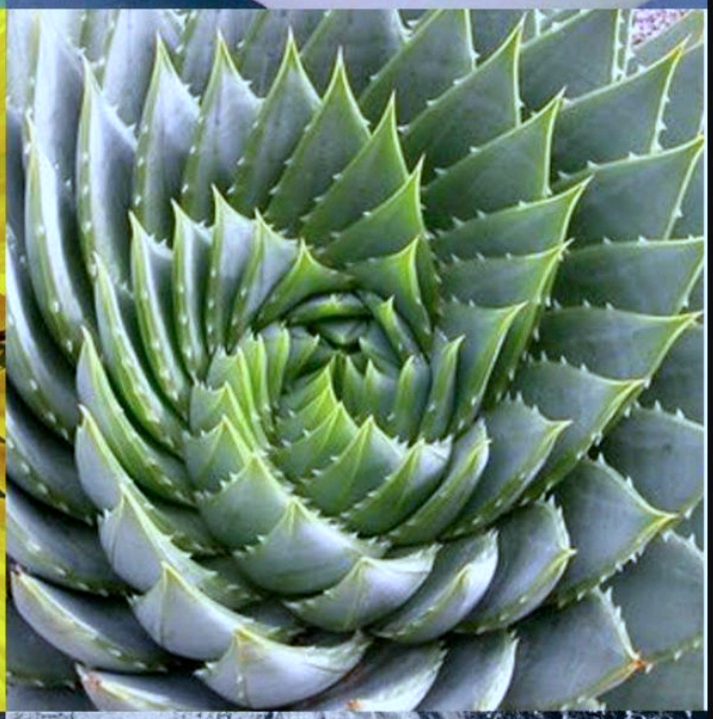
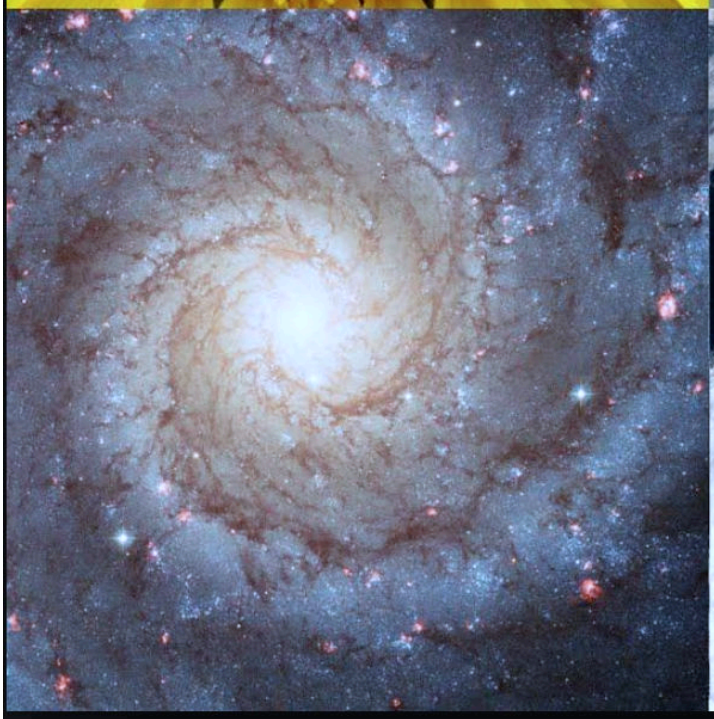
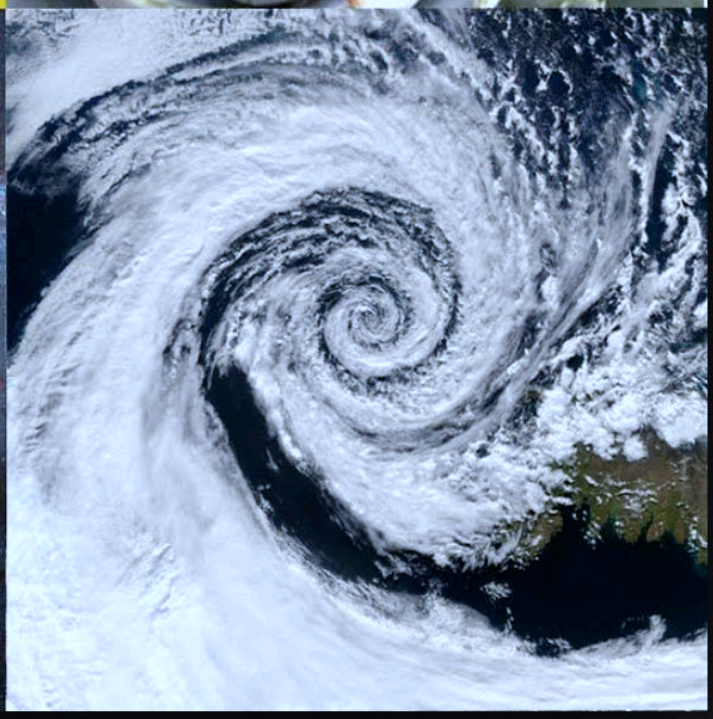
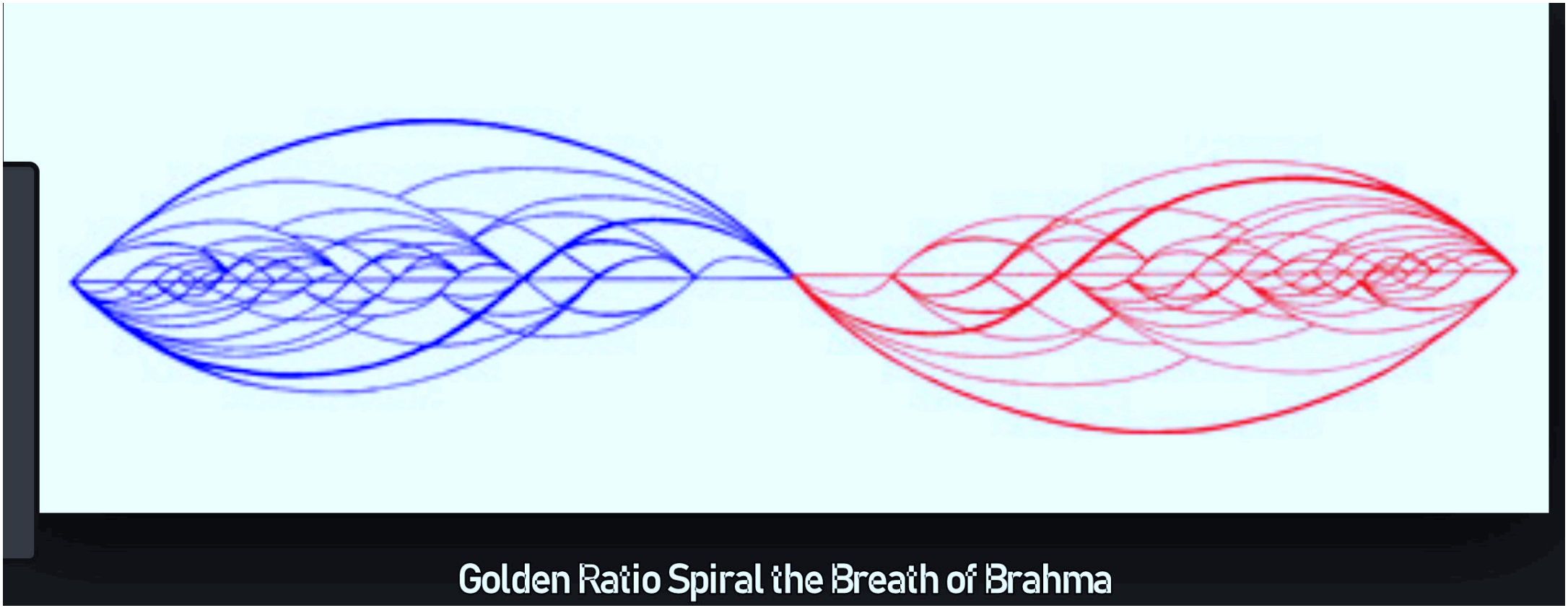
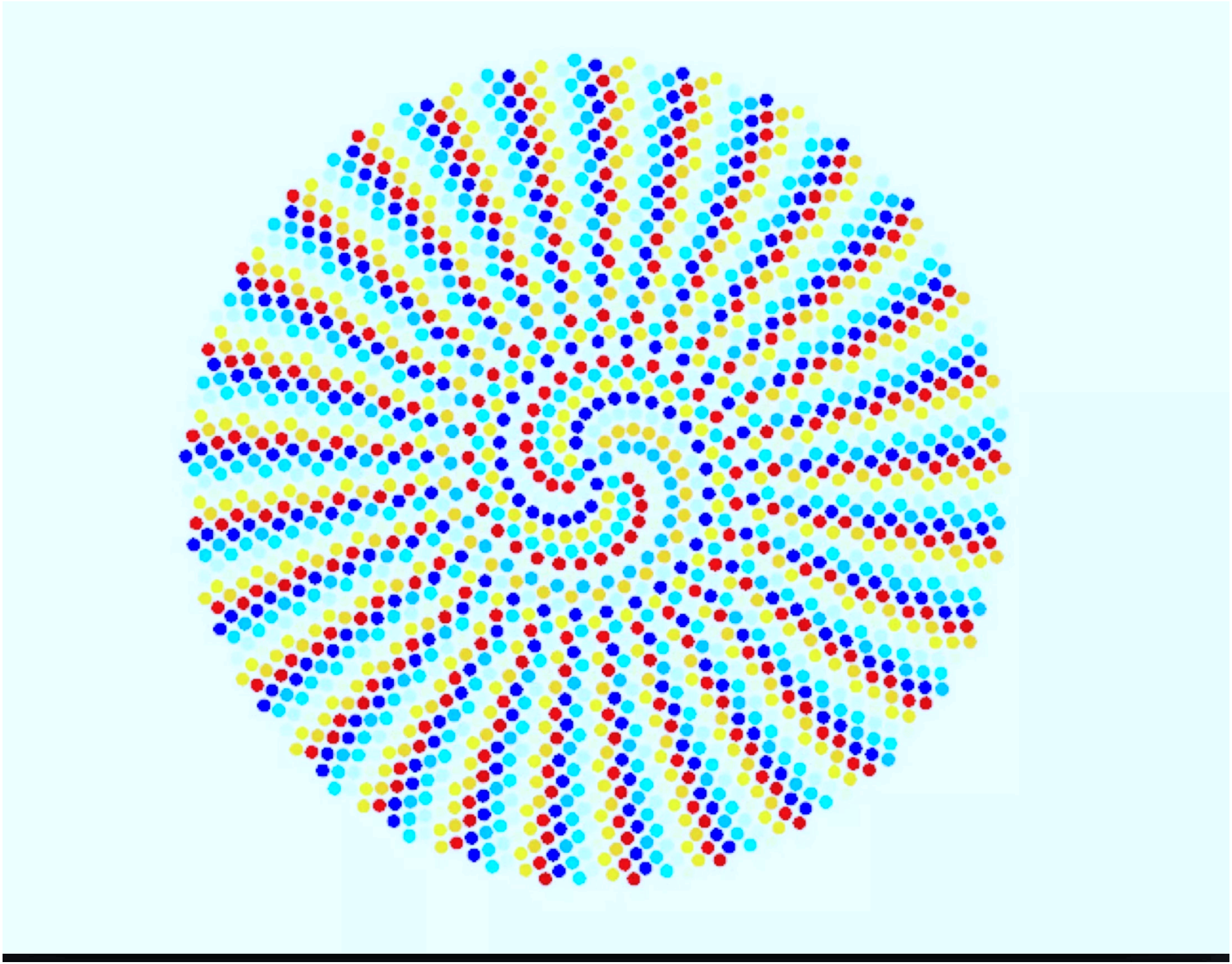






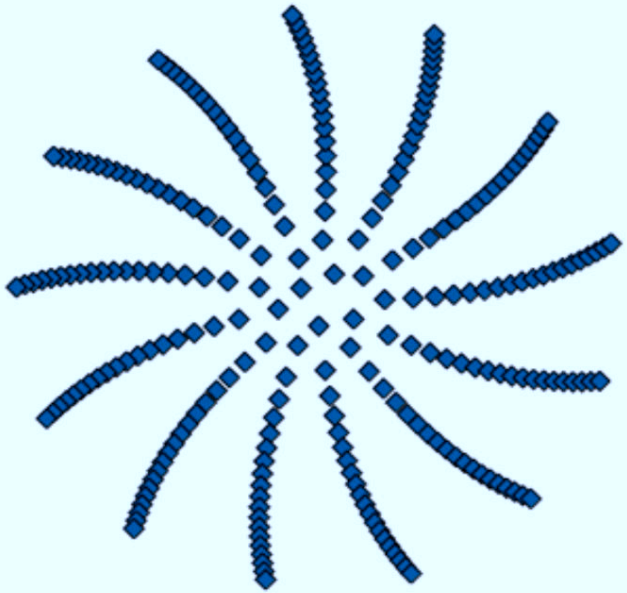
Golden Ratio Spiral the Breath of Brahma



Angle of consecutive seeds

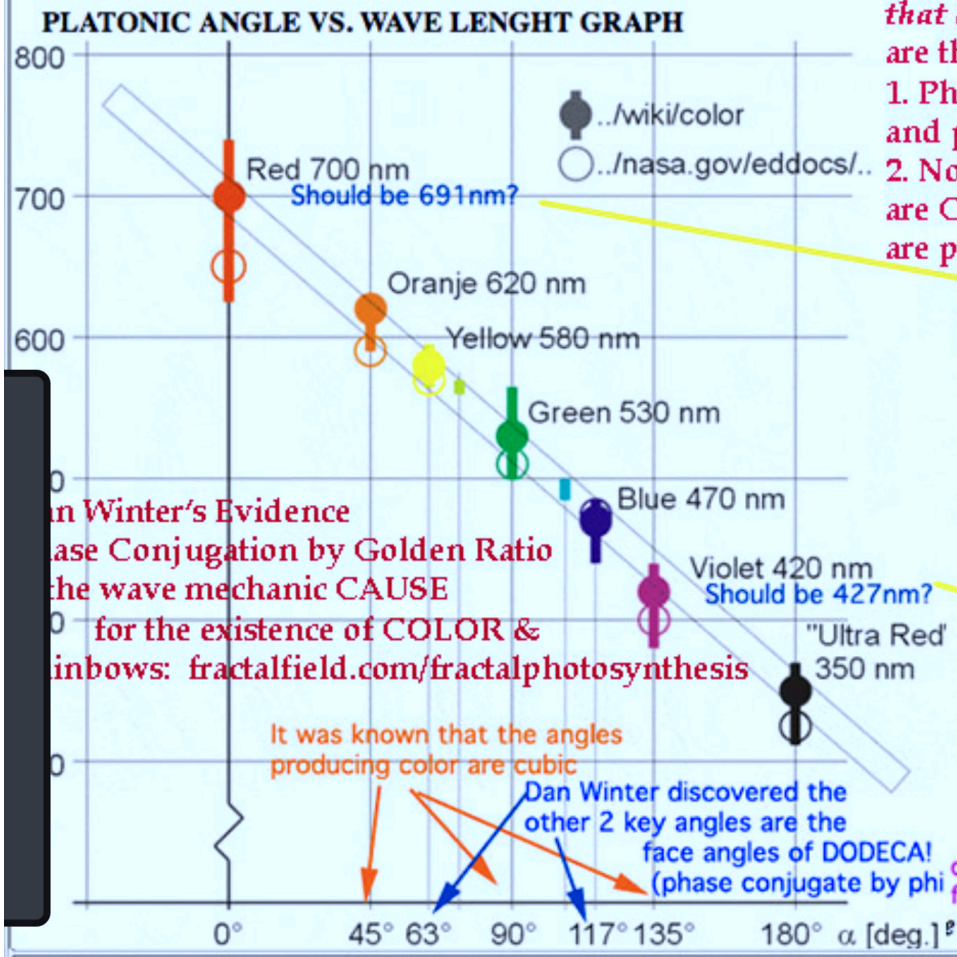
Golden Angle − 1°
136.508...°

Golden Angle
137.508...°



Golden Angle + 1°
138.508...°

For me then I strongly hypothesize - that the REASON color exists - is that the photons as toroids are forced to angle their relative approach in 3D to the DODECA faces- this ALLOWS them to PHASE CONJUGATE CONSTRUCTIVELY - and THIS is what causes them to emerge at the dodeca face angles CALLED- COLOR!



n Winter's Evidence
ase Conjugation by Golden Ratio
he wave mechanic CAUSE
for the existence of COLOR &
inbows: fractalfield.com/fractalphotosynthesis

It was known that the angles producing color are cubic

Dan Winter discovered the other 2 key angles are the face angles of DODECA! (phase conjugate by phi

3 dramatic new physics equation evidences from Dan Winter
that color perception / and biologic photosynthesis
are the SAME NEGENTROPIC PHASE CONJUGATE COLLAPSE wave mechanic
1. Photons (travelling toroidally)- within the visible octave- the red 691 nm, and purple 427 nm are EXACTLY phase conjugate exponents of planck..
2. Note bottom left- platonic symmetry tilt angles of ALL the primary colors are CUBIC (red 0 /orange 45 /green 90 /violet 135) - while Yellow/Blue are precisely the 63/117 degree DODECA PHASE CONJUGATE face angles!

Photosynthetically Useful Radiation.

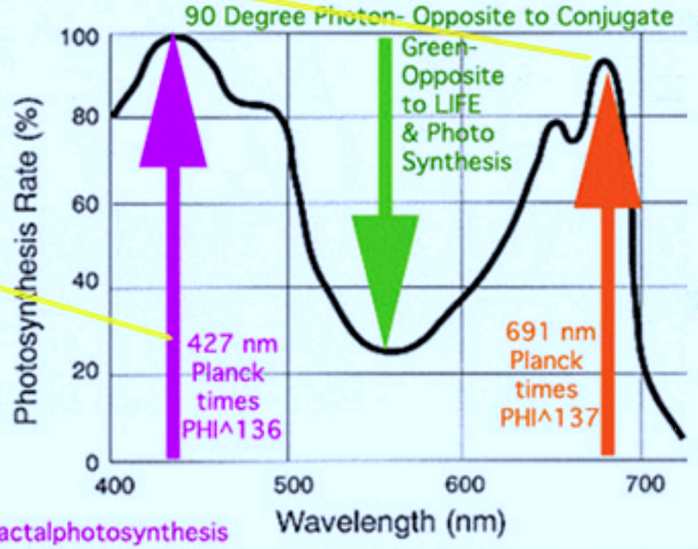
A graph of the rate of Photosynthesis and its relationship with different wavelengths of light indicates shows that the middle region of the visible light spectrum is of the least importance as far as photosynthesis is concerned.

and

PHASE CONJUGATION -Golden Ratio times PLANCK LENGTH

predicts CHARGE DISTRIBUTION EFFICIENCY

THEREFORE LIFE



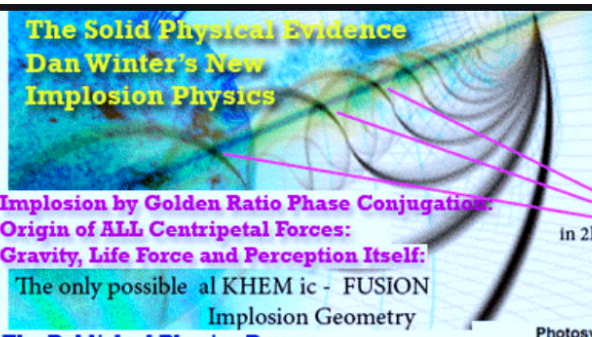
3. as Dan proved THE 2 frequencies of Photosynthesis are exactly phase conjugate (exact golden ratio) exponents of planck length- per Dan's equation.

discussion fractalfield.com/fractalphotosynthesis

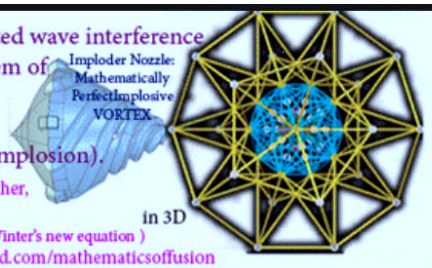
Conjugation by Golden Ratio DOES Quantify and define the color spectra AND its bioactive peaks!

Dan's perspective: RE: new symmetry model of ORIGIN OF COLOR - below - based on DODEC - Dan suggests that the most likely reason the primary colors frequencies (P1=R, P2=Y, P3=B) differential angles are accurately predicted by the dodecahedron planes central angles is because PHASE CONJUGATION is specifically permitted BY THE GOLDEN RATIO stellations of this dodecahedron. He hypothesizes that the REASON the photon toroidal vortex HAVE to find dodeca symmetries -and thus create COLOR- is because that dodeca array is the only way PHASE CONJUGATION and therefore 3D sorting / successful compression + distribution can happen.

The Solid Physical Evidence
Dan Winter's New Implosion Physics



Visualizing how Golden Ratio perfected wave interference 'phase conjugation' - solves the problem of non-destructive interference and therefore non-destructive compression (Implosion).



Implosion by Golden Ratio Phase Conjugation:
Origin of ALL Centripetal Forces:
Gravity, Life Force and Perception Itself:
The only possible al KHEM ic - FUSION
Implosion Geometry

in 2D

Hydrogen Radii are spaced from each other, AND spaced from nuclear center - by EXACTLY Golden Mean Ratio (Winter's new equation) because (as we proved: www.fractalfield.com/mathematicsoffusion only that 'phase conjugate' geometry solves CONSTRUCTIVE interference AND compression!

Dan Winter

3D Model - assembly kit: www.goldenmean.info/kit

The Published Physics Paper:
www.fractalfield.com/mathematicsoffusion

Photosynthetically Useful Radiation.
A graph of the rate of Photosynthesis and its relationship with different wavelengths of light indicates shows that the middle region of the visible light spectrum is of the least importance as far as photosynthesis is concerned.

Dan Winter' s new equation proving the phase conjugate (golden ratio) structure of hydrogen: goldenmean.info/goldenproof

Planck Length x Golden Ratio ^ 116 power = .282537 Angstrom -The First Radii of Hydrogen
Planck Length x Golden Ratio ^ 117 power = .457154 Angstrom -The Second Radii of Hydrogen
Planck Length x Golden Ratio ^ 118 power = .739691 Angstrom -The Third Radii of Hydrogen

Planck Length = (1.616252 x 10^-35 meter) , Golden Ratio = (1.618033989)

PHASE CONJUGATION -Golden Ratio times PLANCK LENGTH

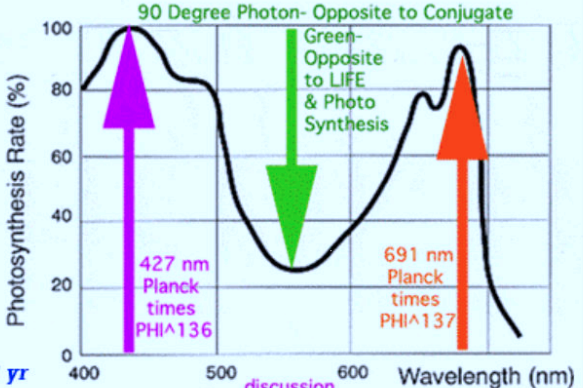
Dan Winter's new equation proving the phase conjugate (charge distribution perfected) NATURE of Photosynthesis

Planck Length x Golden Ratio ^ 136 power = 427 nm
Planck Length x Golden Ratio ^ 137 power = 691 nm

predicts CHARGE DISTRIBUTION EFFICIENCY

The ONLY 2 Frequencies (colors) MOTORIZING PHOTOSYNTHESIS!
fractalfield.com/fractalphotosynthesis

THEREFORE LIFE



Dan Winter's new equation proving the phase conjugate (charge distribution perfected) life giving TIMING of our planet orbit:

Solar year = Plank time x Golden Ratio ^241.01 (1.35125 x 10^-43) x (1.618 ^ 241.01) = 1 yr
Venus Year = Plank time x Golden Ratio ^240 (224.701 Earth days / Solar Year 365.242 = .6152 (~ Golden Ratio)

discussion
fractalfield.com/fractalphotosynthesis

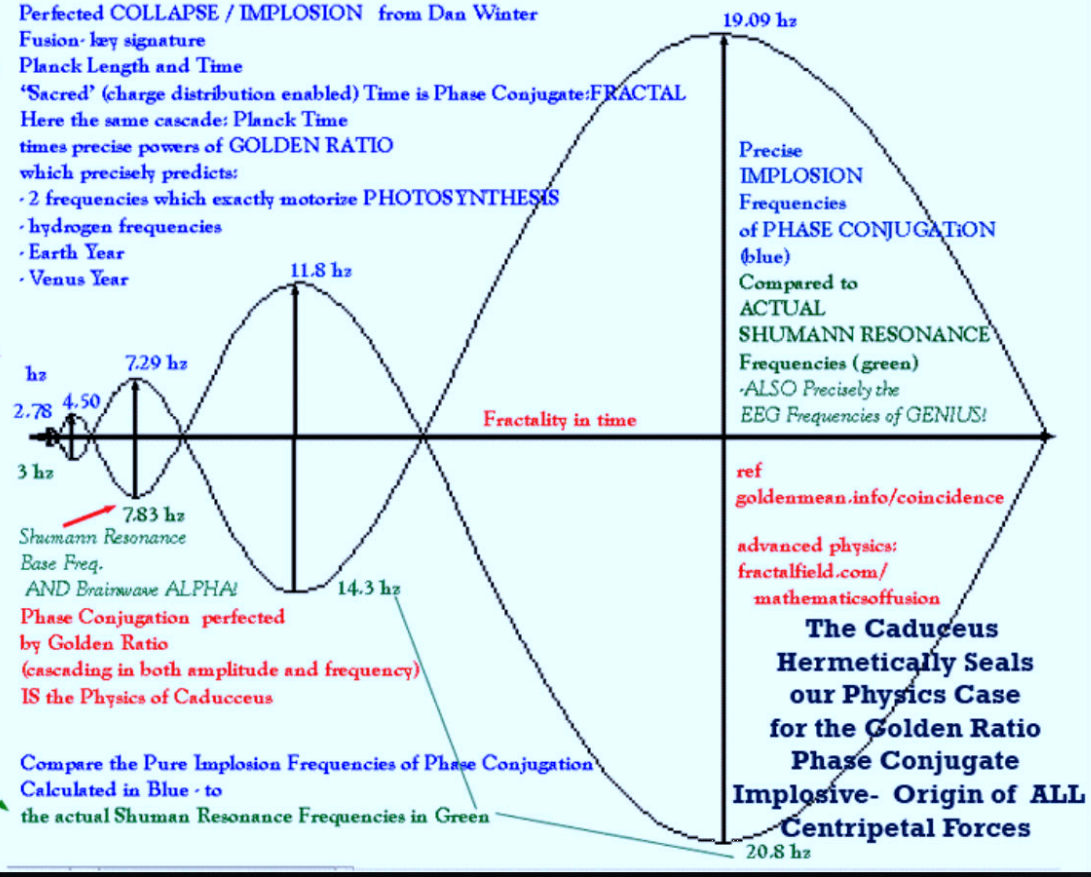
Phase Conjugation by Golden Ratio DOES Quantify and define the color spectra AND its bioactive peaks!

ince Time is only defined by
e period of charge rotation-
is shows
e PHYSICS OF COINCIDENCE
Charge Coupling by Conjugation
ef: goldenmean.info/coincidence

and Finally: Dan Winter's New Equation proving the Golden Ratio / Phase Conjugate (and Centripetal / Implosive) Frequency Recipe of Brain Wave Alpha / Beta of Peak Perception (Bliss) see: goldenmean.info/clinicalintro AND the Actual Harmonics of Earth's Shumann Resonance!

Compare the Shumann Frequencies (right) which are the Golden Ratio Cascade Basis of EEG/ Brainwaves of Peak Perception (Bliss).. with the PRECISE HARMONICS Planck Time x Exponents of GOLDEN RATIO!

2.78467 <-Pure Phase Conjugate
4.50569
7.29037 *Charge Compression (Implosive/ Negentropic)
11.7961 vs. actual
19.0864 Shumann frequencies
* **(Brainwave Alpha = Schumann Resonance)**

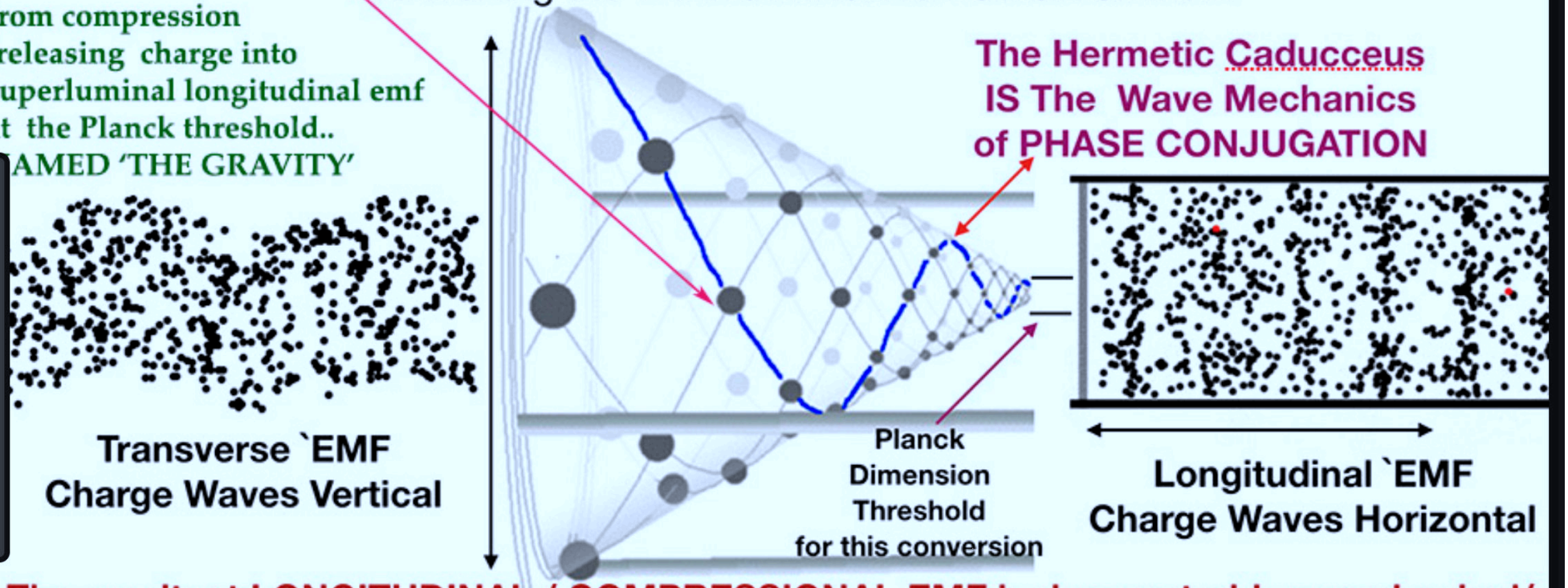


Recursive golden ratio enabled 'conjugate' constructive heterodyning of Phase Velocities PRODUCING (charge) ACCELERATION from compression (releasing charge into superluminal longitudinal emf at the Planck threshold.. NAMED 'THE GRAVITY'

How PHASE CONJUGATION- WAVE FRACTALITY converts the vertical TRANSVERSE EMF WAVE in to LONGITUDINAL /"SCALAR" COMPRESSIONAL WAVES - The perfect GOLDEN SPIRAL ON THE CONE 'perfected translation of vorticity' makes the 'EL' / phase shift (thru light speed) converting the TRANSVERSE to LONGITUDINAL

copyright: Dan Winter fractalfield.com

The Hermetic Caducceus IS The Wave Mechanics of PHASE CONJUGATION

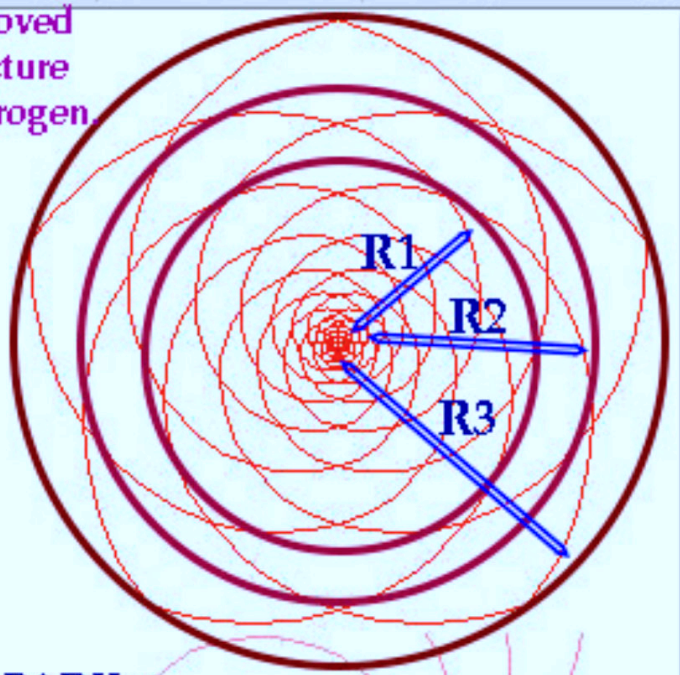


The resultant LONGITUDINAL / COMPRESSIONAL EMF is demonstrably superluminal/ faster than light: this enables remote action at a distance.

This 'way out' (thru lightspeed) for charge during perfect non-destructive conjugate implosive charge compression- is the mechanism / cause of *gravity, * electro-negativity, *life force, *consciousness , ALL negentropy.

Here is proof that Dan Winter located, identified and mathematically proved the fractal structure of hydrogen.

Protons (and Gravity) exist because of
FRACTAL / Conjugate Embedding in the Electron



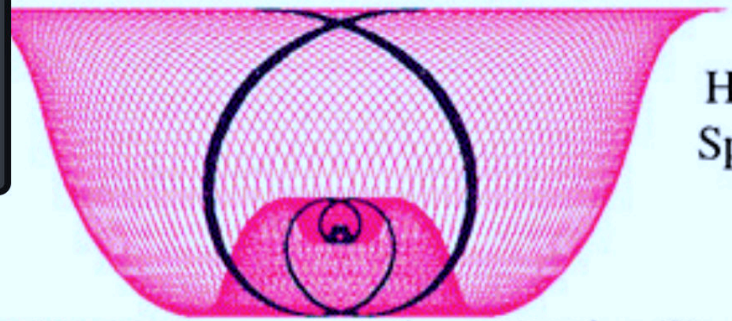
Only the Golden Spiral charge compression
trajectory allows the phase VELOCITIES
to interfere / heterodyne
recursively constructively.... THEREFORE
Only this geometry turns charge compression
toward center .. in to charge ACCELERATION
toward center.. named THE GRAVITY.

Dan Winter's new equation accurate HYDROGEN RADII

hase Conjugation R1 = Planck x Phi^116
Hydrogen R2 = Planck x Phi^117
he Smoking Gun! R3 = Planck x Phi^118

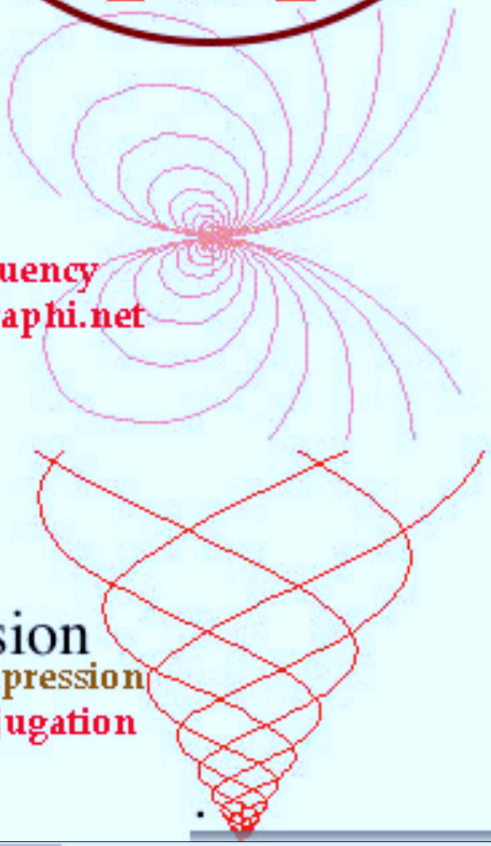
Planck Length
Phi= Golden Ratio

For the power of this frequency signature on plasma: Theraphi.net



Here are 3 views of the Spiral
Spin Path to the "Zero Point" /
Implosion..

Top / Oblique / Side..



Golden Ratio
IS Self-Similarity
Perfected - Therefore
this IS Fractality
Perfected!

The "Holy Grail" of Fusion / Implosion

also reveals the electrical nature of compassion:perfect compression

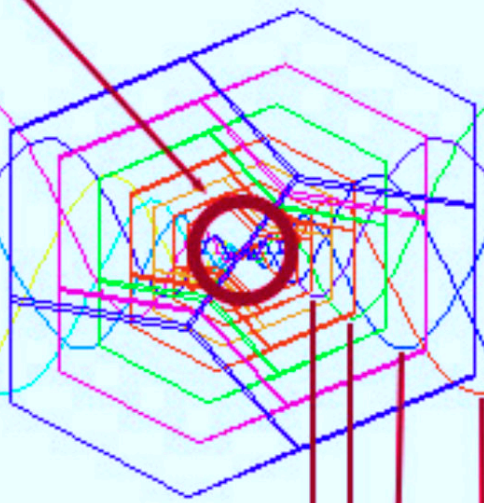
Dear Scientist: if you say golden ratio phase conjugation
is NOT the cause of gravity- then pray tell us..
why is HYDROGEN BUILT THAT WAY????

from Dan Winter www.goldenmean.info The cause of gravity, color, perception,
and Life Force:
The Centripetal Charge
Compression
originates:
scaled precisely
to
Planck Length
& Planck Time
multiplied
precisely
y powers of
olden Ratio
his
HASE CONJUGATION
dds & multiplies
onstructively
hase VELOCITIES
onverting Compression (of charge or plasma) in to ACCELERATION (gravity) !

Planck Length & Time
Universal Musical
Key Signature of
the Fractal Quantum Foam

Fractal Space Time
Essential Wave Mechanics
producing all negentropic forces:

The Caduceus
IS phase conjugation



Golden Ratio
Caducceus
Phase Conjugation
and Self Similarity
Wave Mechanics
Produce Constructive
Compression-
Creating Acceleration
*from Compression**
Toward Center
(called 'gravity)
**because phase velocities*
can heterodyne
recursively constructively
only in golden ratio

Winter's new equations have proven:
These virtually exact even Golden Ratio FRACTAL Phase Conjugate Multiples of Planck Length and TIme predict compelling
examples of NEGENTROPIC / SELF ORGANIZING and CENTRIPETAL FORCES - like: *Cellular ATP Freq
** Hydrogen Radii, * the ONLY 2 effective Photosynthesis Frequencies, * Schumann Resonance Frequencies* *HRV LF&HF Frequenc
** Brainwave Frequencies of Peak Perception / Bliss, * Sacral Cranial Tidal Frequencies , * Ear Ringing Heard by Meditators*
** Virtually Exactly the Duration of Earth Year and Venus Year.. (& the Priore and also Rauscher frequencies of bioactive fields!)*
and the essential dodeca stellation 3D fractal symmetry of Alchemic collapse / fusion / transmutation,
DNA / living proteins as pent, Earth magnetic grid, Solar system orbital mechanics, and symmetry of masses in the universe!

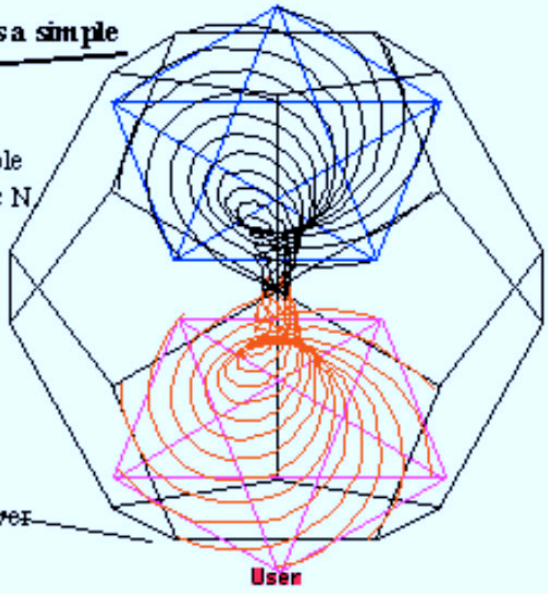
It has long been known that one side of a magnet (centrifugal) will decrease the pain, while the other (centriPETAL) will increase the pain AND the rate of healing (restored centripetal force). NOW we know that this vorticity has a measureable gravity effect- AND why.. and why it is time biased..

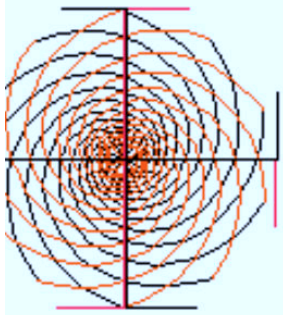
because the acceleration of flux (the centripetal side) defines the charge rotation (accelerant of spin) which defines time! This also predicts Phase Conjugate Magnetics which HEAL. original notes: goldenmean.info/magnetics

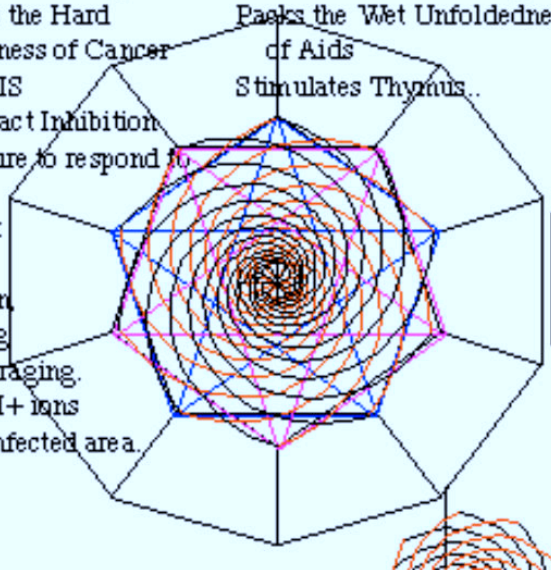
Magnetic Polarity: Essence of Flow Direction .. Converging/Diverging Flux Lines

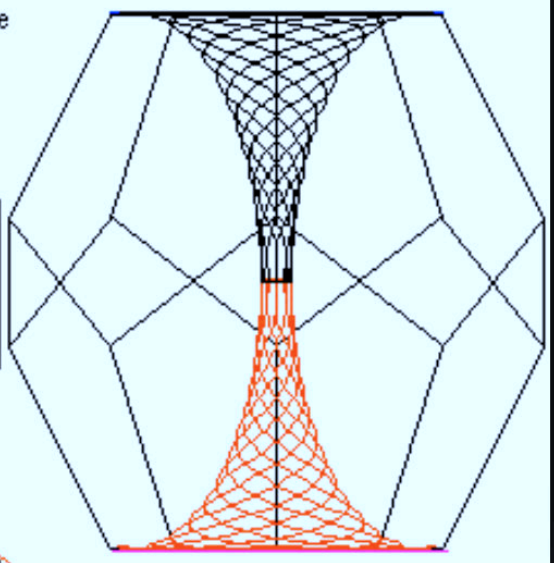
Understanding the Biological effects of Magnetism as a simple twister flowing either inward or outward

Bio-Magnetic North	Bio-Magnetic South
Attracted to South Pole	Attracted to North Pole
Conventional Magntc S.	Conventional Magntc N
Outward Folding Flux	Inward Folding Flux
Yin	Yang
Centrifugal	Centripedal
Unpacking	Packing
Negative	Positive
Counterclockwise	Clockwise
Blue Making Power	Red Making Power
Wet Making Power	Hard Making Power
Touch Making Power	Separate Making Power
Pentacle Upright	Pentacle Inverted
Cooling	Warming
Swatika Left	Swastika Right
Ieve/Word Making Power	Adamic/Atomic Making
Unpacks the Hard foldedness of Cancer (Cancer IS Contact Inhibition The failure to respond to touch) Reduces: Pain, Infection, Swelling, Hemmoraging. Moves H+ ions out of infected area.	Packs the Wet Unfoldedne of Aids Stimulates Thymus..









negentropy

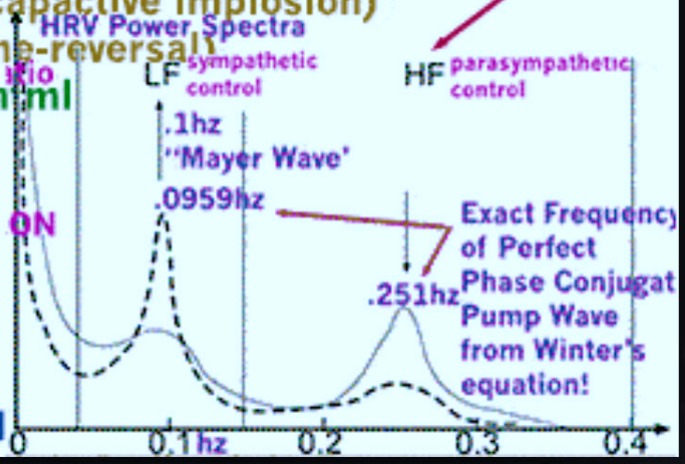
ogle.com/url?sa=i&source=images&cd=&ved=2ahUKEwjUZ0j_6pThAhUPKK0KHd1eCRcQjRx6BAgBEAU&

Dan Winter's compelling formula: THE Fractal Physics:
Exact integer exponents of golden ratio (phase conjugate) multiples of PLANCK length and time
Graphic: the back cover of his new book www.fractalfield.com/fractalspacetime
Animated in 3D: www.goldenmean.info/grail

- the generalized wave geometric cause of gravity, life force, and biologic negentropy
- why objects fall to the ground
- how wave geometry creates negentropy so well proven in phase conjugate optics
- how Earth and it's Schumann harmonic cascade (Dan newly proved is a precise 'conjugate pump wave')
  creates the self organization evidenced in the GAIA HYPOTHESIS
- golden ratio phase conjugation is the only wave geometry which defines a 'fractal field'
- these virtually exact integer exponents of golden ratio (phase conjugate)
  multiples of PLANCK length & time predict: (Dan Winter's original discoveries)

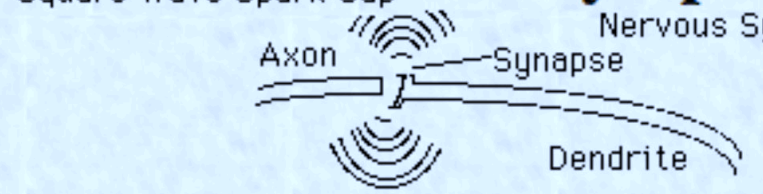
* multiple exact radii of hydrogen
* the exact only 2 frequencies which motorize photosynthesis
* virtually exact Schumann Planet harmonics
* the brainwave (ALPHA / BETA) frequency cascade of peak perception / bliss
* virtually exact duration of the Earth year and Venus year
* virtually exact frequencies PRIORE and also RAUSCHER used to heal
* exact frequency and geometry used to create commercially proven life giving (bioactive) fields at
  TheImploder.com (hydrodynamic implosion) and Pyraphi.com (capactive implosion)
  and the PRIORE rejuvenation field. (phase conjugate plasma time-reversal)
  www.goldenmean.info/phaseconjugate/RejuvenationFieldTech.html
  And documented rejuvenation effect:
  www.imploderspa.com/ImploderSpaBrochure.pdf

Update: May 2015
Winter's equation
Perfect Implosive Negentropy
ALSO predicts ADP/ATP Wavelgth
AND- exactly the
HRV LF and HF frequencies!



"God is the perfectly replicable part of the pattern/wave /meme
because charge distribution perfected conjugation / fractality
is what make any field centripetal, negentropic, and hence mindful..
God's domain- Dominus Vobiscum: literally- The Divine=Perfectly Branched

The Synaptic Spark: Spin Distibuted Awareness

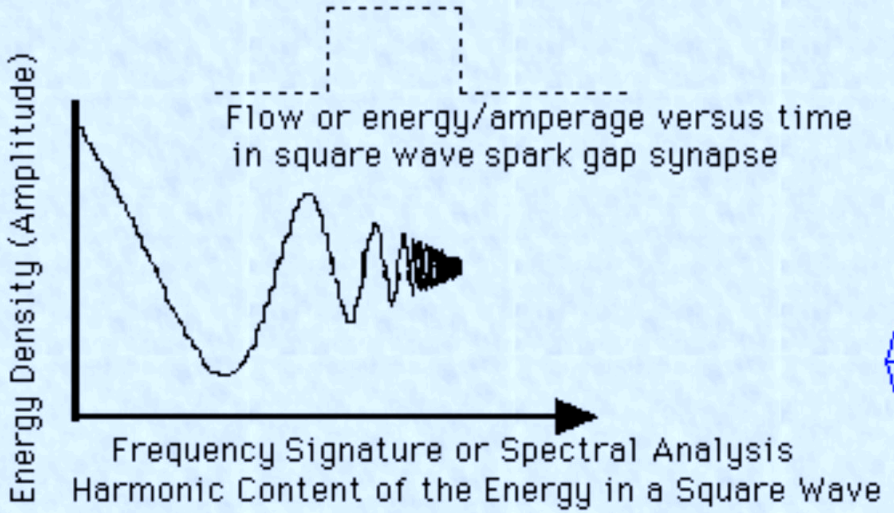


by Dan Winter

goldenmean.info/synapse/synapse.htm

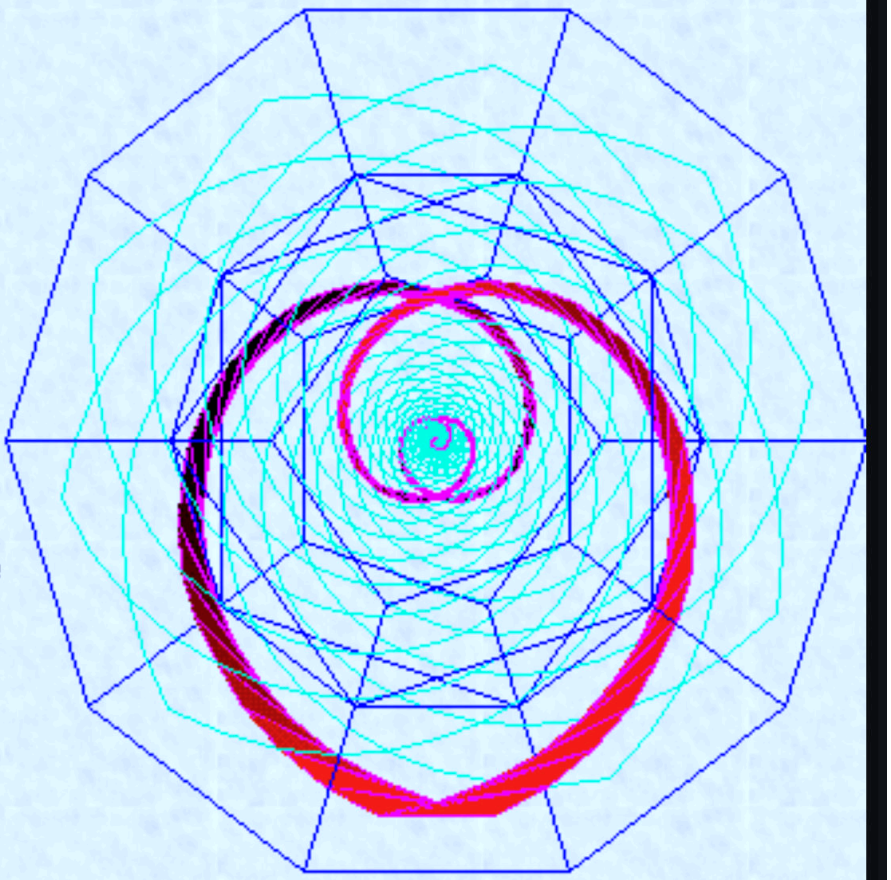
The "radiance" charge distribution radiating from the synapse spark gap is an "experiment in sharing" for spin, the harmonics contained in the ringing of the synapse literally determine whether awareness will be distributed. Perfectly fractal harmonic content=perfectly embedded inner hologram =power to move matter with thought.

How the Synapse-
AND the Brain Cavity..
AND the Sacral Cranial Pump
.. create the healing STILL POINT



Note the amazing similarity to the harmonic power frequency spectrum pictures we've taken from the heart at the moment of love!
Compassion is learning to share to the spin..
distribute the charge

AWARENESS AS CHARGE DISTRIBUTION HAPPENS
WHEN SPIN DISTRIBUTION IS PHASE LOCK OR CENTERED,
RECURSION CALLS YOUR SPINS BACK TO CENTER..
THIS IS A MAP OF PERFECT RECURSION..
GETS TO THE HEART OF THE MATTER DOESN'T IT..



"Harmonic Convergence":
A Phase Conjugate Pump Wave..
becomes Centripetal AND Negentropic

Phase Conjugate optics
begins with "4 wave mixing"
which is effectively a (nano-meter accurate)
CUBE of light waves (right pic) ->

What initiates the GOLDEN RATIO
conjugate of waves which produces
the phase conjugate
-selforganization
and
- time reversal..

is when the approach path into the cube
is perfect, then the pine cone vortex
shape tunnel in a CONE to center..

roducing golden ratio...

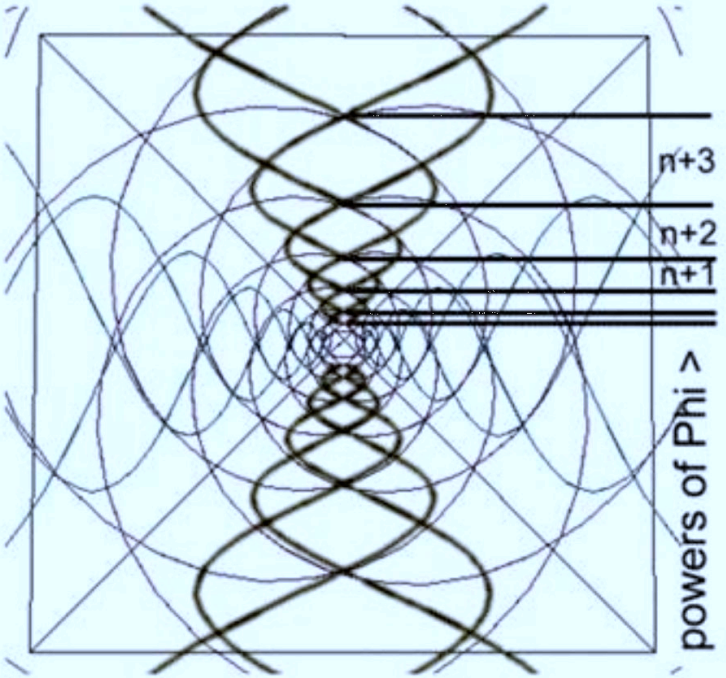
d THAT is where the secret of the
hase conjugate MIRROR material comes in..

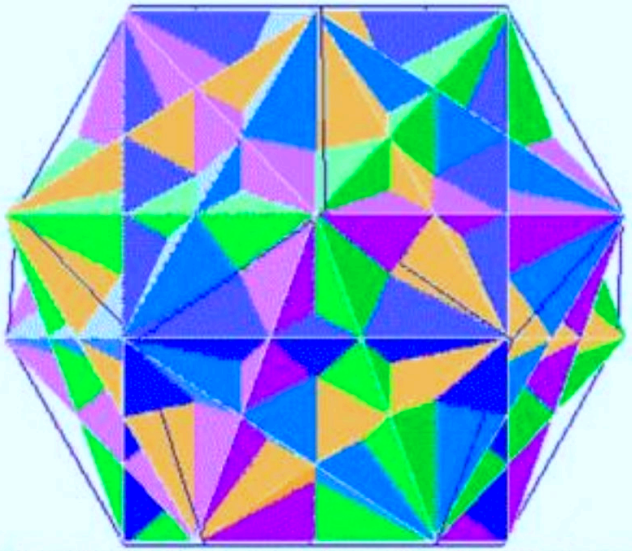
the material of the phase conjugate mirror
s recursive golden ratio relationship
etween atomic nuclei vs shell radii,

THEN-- effectively the CUBE (see 5 cubes right)
can be rotated (embedded) accurately in
the PENT DODEC symmetry
(where golden ratio to center exists on all
nodal lines to center- see elsewhere in this article)..

Note how the vectors and the cones in radial lines
to center of a cube are all a SUBSET of those
which are in the dodec.. Much is learned about how to optimize phase conjugation in wave mechanics.

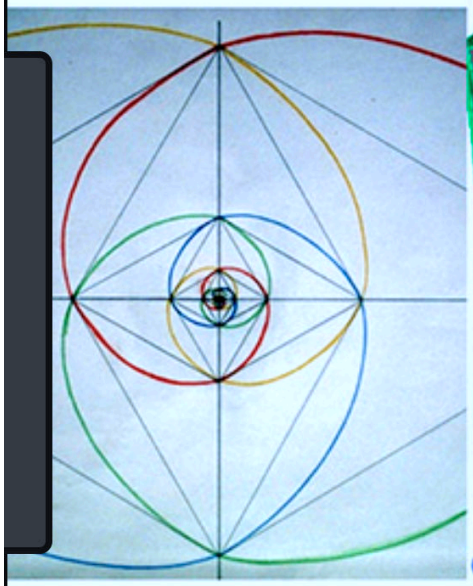
quad implosion tracks mapped by four axes of the tetra symmetry, showing exact Phi ratio beat nodes





The Physics of Rejuvenation producing electric fields:
Where waves of charge IMPLODE accurately
(phase conjugate- like 'pine cones kissing noses')
at that implosion center point-
all waves are 'sorted'- 'negentropically' (self organized).
This produces net increased ORDER

Dan Winter
fractalfield.com
Theraphi.net



This is Dan Winter's precise new equation for the geometry of HYDROGEN which also happens to be the proven geometry of
- every living protein
-DNA
-Earth Grid
_The Universe
: Pent Stellated Dodecahedron

5 years at over 50,000 hits / day! goldenmean.info

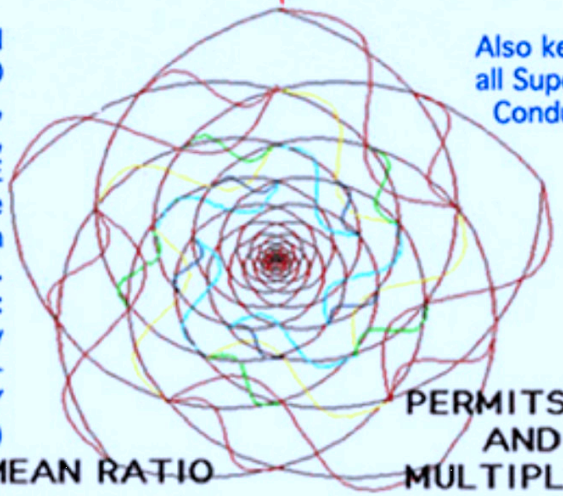
Perfected Wave Collapse becomes IMPLOSIVE CENTRIPETAL

(Planck Length x Phi=Hydrogen Radii .. and...)
goldenmean.info/goldenproof

to Gain Energy During Collapse

Key to ALL Non-Linear Energy Tech. (Hydrogen Energy for example)

Also key to all Super-Conductivity.



This 3D Wave Fractal - PHASE CONJUGATION
Perfected by GOLDEN RATIO
is the CAUSE of Gravity, Electronegativity, LIFE FORCE, Perception, and ALL CENTRIPETAL Forces, ALL SELF ORGANIZATION - BECAUSE
Golden Ratio is the only general solution to constructive wave interference - because it is the general solution to recursive wave heterodyning.
The Mechanism:
when the waves (here) add and multiply recursively constructively their wave length - (& frequency)- THEY ALSO ADD AND MULTIPLY CONSTRUCTIVELY RECURSIVELY THEIR WAVE VELOCITY (phase velocity)
Producing ACCELERATION of Charge (called GRAVITY) from compression.

GOLDEN MEAN RATIO

PERMITS ADDING AND MULTIPLYING OF WAVES

Science Summary: goldenmean.info/selforganization

Click here to download 89 slide powerpoint for Dan Winter's Rejuvenation Physics
Theraphi.net/rejuvenation

Dan Winter's new equation for
the ORIGIN OF ALL NEGENTROPY
and CAUSE OF GRAVITY

exerpt
from the cover of his new book
fractalfield.com/fractalspacetime

This is the precise frequency cascade
(planck time x integer exponents of golden ratio
called PHASE CONJUGATION)
which identifies every negentropic lifegiving process
particularly including the exact 2 frequencies of
photosynthesis- and the exact frequencies
which make healing fields bioactive - like PRIORE,
RAUSCHER etc..
(and predict almost precisely the
duration of the Earth AND Venus year!!)

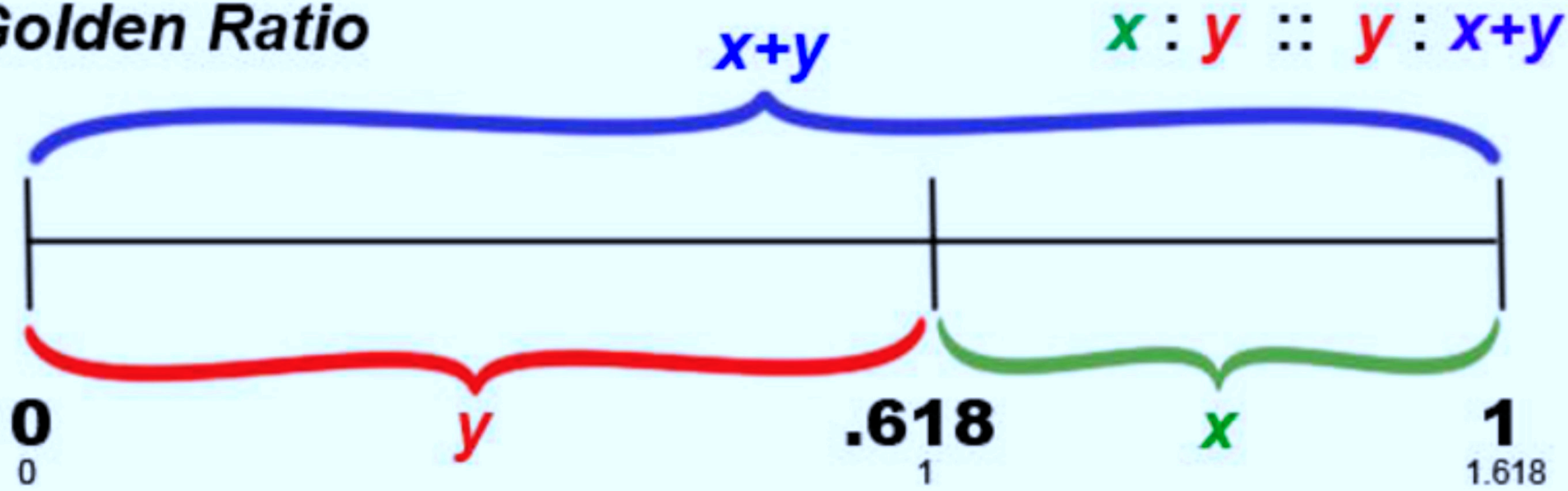
These are the exact measured frequency harmonics of the
Earth's SCHUMANN RESONANCE (ignore Greg Braden's confusion)

SO - CAN YOU GUESS WHAT NEEDS TO BE DONE now
to make GAIA emerge from chaos????????

Hint- fix the music, fix the grid- it can be proven to eliminate pollution and more..!

Golden Ratio

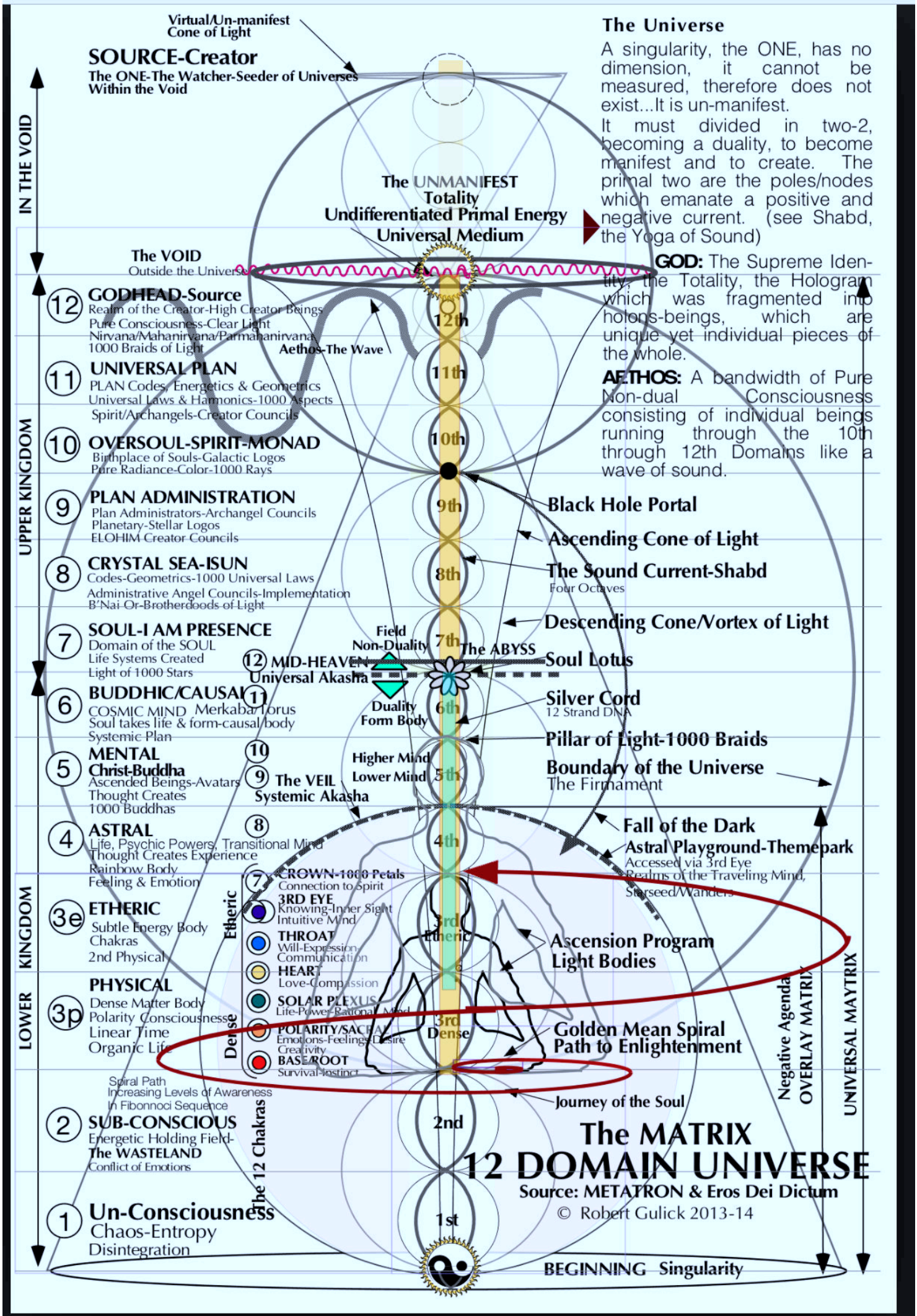
$x : y :: y : x+y$



Fibonacci Sequence

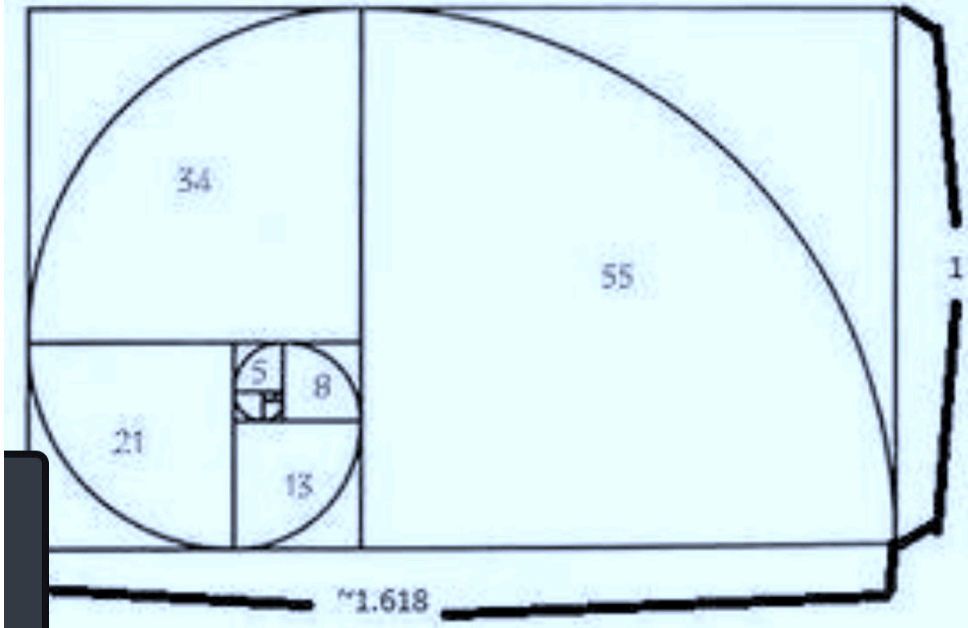
0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610...

3 x .618 ≈ 2	13 x .618 ≈ 8	55 x .618 ≈ 34
5 x .618 ≈ 3	21 x .618 ≈ 13	89 x .618 ≈ 55
8 x .618 ≈ 5	34 x .618 ≈ 21	144 x .618 ≈ 89

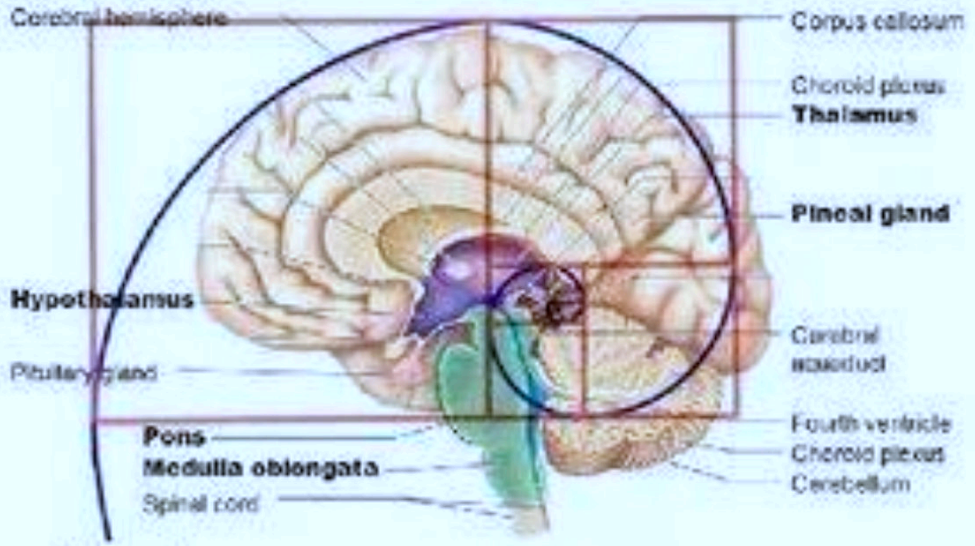

Virtual/Un-manifest
Cone of Light
SOURCE-Creator
The ONE-The Watcher-Seeder of Universes
Within the Void
IN THE VOID
The UNMANIFEST
Totality
Undifferentiated Primal Energy
Universal Medium
The VOID
Outside the Universe
Aethos-The Wave
12 GODHEAD-Source
Realm of the Creator-High Creator Beings
Pure Consciousness-Clear Light
Nirvana/Mahanirvana/Parmahanirvana
1000 Braids of Light
11 UNIVERSAL PLAN
PLAN Codes, Energetics & Geometrics
Universal Laws & Harmonics-1000 Aspects
Spirit/Archangels-Creator Councils
10 OVERSOUL-SPIRIT-MONAD
Birthplace of Souls-Galactic Logos
Pure Radiance-Color-1000 Rays
9 PLAN ADMINISTRATION
Plan Administrators-Archangel Councils
Planetary-Stellar Logos
ELOHIM Creator Councils
8 CRYSTAL SEA-ISUN
Codes-Geometrics-1000 Universal Laws
Administrative Angel Councils-Implementation
B'Nai Or-Brotherdoods of Light
7 SOUL-I AM PRESENCE
Domain of the SOUL
Life Systems Created
Light of 1000 Stars
6 BUDDHIC/CAUSAL
COSMIC MIND Merkaba/Torus
Soul takes life & form-causal body
Systemic Plan
5 MENTAL
Christ-Buddha
Ascended Beings-Avatars
Thought Creates
1000 Buddhas
4 ASTRAL
Life, Psychic Powers, Transitional Mind
Thought Creates Experience
Rainbow Body
Feeling & Emotion
3e ETHERIC
Subtle Energy Body
Chakras
2nd Physical
3p PHYSICAL
Dense Matter Body
Polarity Consciousness
Linear Time
Organic Life
Spiral Path
Increasing Levels of Awareness
In Fibonnoci Sequence
2 SUB-CONSCIOUS
Energetic Holding Field-
The WASTELAND
Conflict of Emotions
1 Un-Consciousness
Chaos-Entropy
Disintegration
UPPER KINGDOM
LOWER KINGDOM
12th
11th
10th
9th
8th
7th
6th
5th
4th
3rd Etheric
3rd Dense
2nd
1st
Field
Non-Duality
The ABYSS
12 MID-HEAVEN
Universal Akasha
11
Duality
Form Body
10
Higher Mind
Lower Mind
9 The VEIL
Systemic Akasha
8
7 CROWN-1000 Petals
Connection to Spirit
3RD EYE
Knowing-Inner Sight
Intuitive Mind
THROAT
Will-Expression
Communication
HEART
Love-Compassion
SOLAR PLEXUS
Life-Power-Rational Mind
POLARITY/SACRAL
Emotions-Feelings-Desire
Creativity
BASE/ROOT
Survival-Instinct
Etheric
Dense
The 12 Chakras
The Universe
A singularity, the ONE, has no dimension, it cannot be measured, therefore does not exist...It is un-manifest.
It must divided in two-2, becoming a duality, to become manifest and to create. The primal two are the poles/nodes which emanate a positive and negative current. (see Shabd, the Yoga of Sound)
GOD: The Supreme Identity, the Totality, the Hologram which was fragmented into holons-beings, which are unique yet individual pieces of the whole.
AETHOS: A bandwidth of Pure Non-dual Consciousness consisting of individual beings running through the 10th through 12th Domains like a wave of sound.
Black Hole Portal
Ascending Cone of Light
The Sound Current-Shabd
Four Octaves
Descending Cone/Vortex of Light
Soul Lotus
Silver Cord
12 Strand DNA
Pillar of Light-1000 Braids
Boundary of the Universe
The Firmament
Fall of the Dark
Astral Playground-Themepark
Accessed via 3rd Eye
Realms of the Traveling Mind,
Starseed/Wanders
Ascension Program
Light Bodies
Golden Mean Spiral
Path to Enlightenment
Journey of the Soul
Negative Agenda
OVERLAY MATRIX
UNIVERSAL MAYTRIX
The MATRIX
12 DOMAIN UNIVERSE
Source: METATRON & Eros Dei Dictum
© Robert Gulick 2013-14
BEGINNING Singularity

https://www.facebook.com/QuantumWorldAwakenYourMind

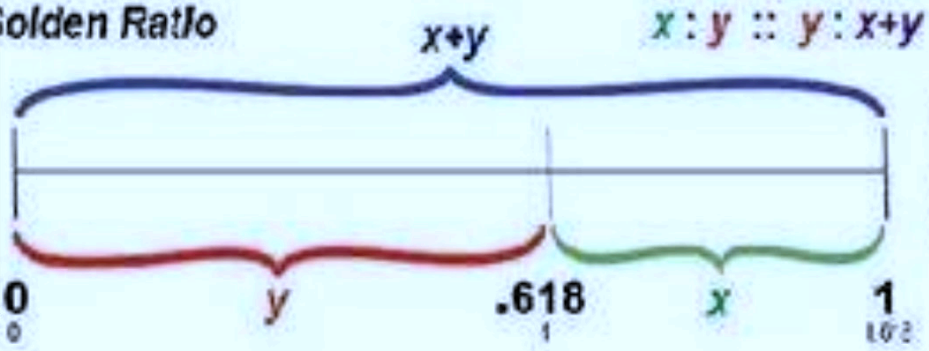
THE GOLDEN RATIO IN THE HUMAN BODY

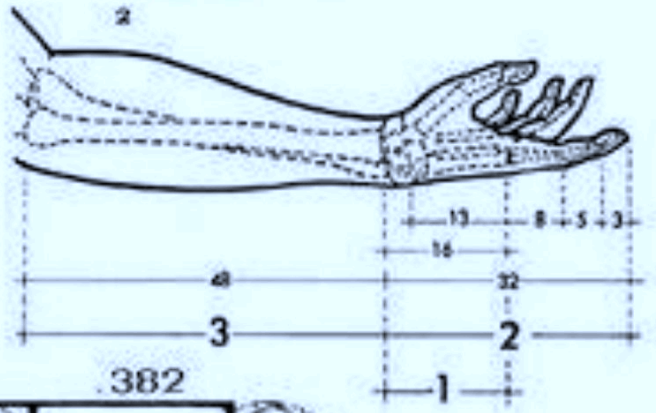


Pineal Gland



Golden Ratio





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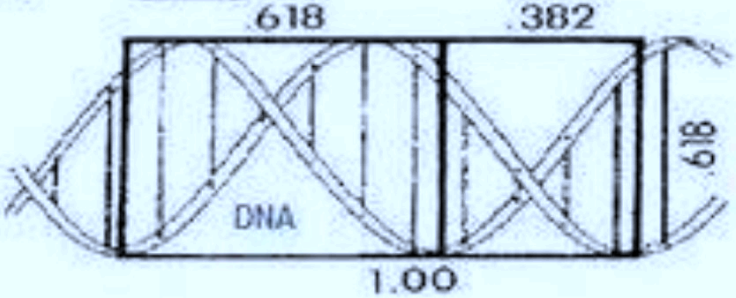
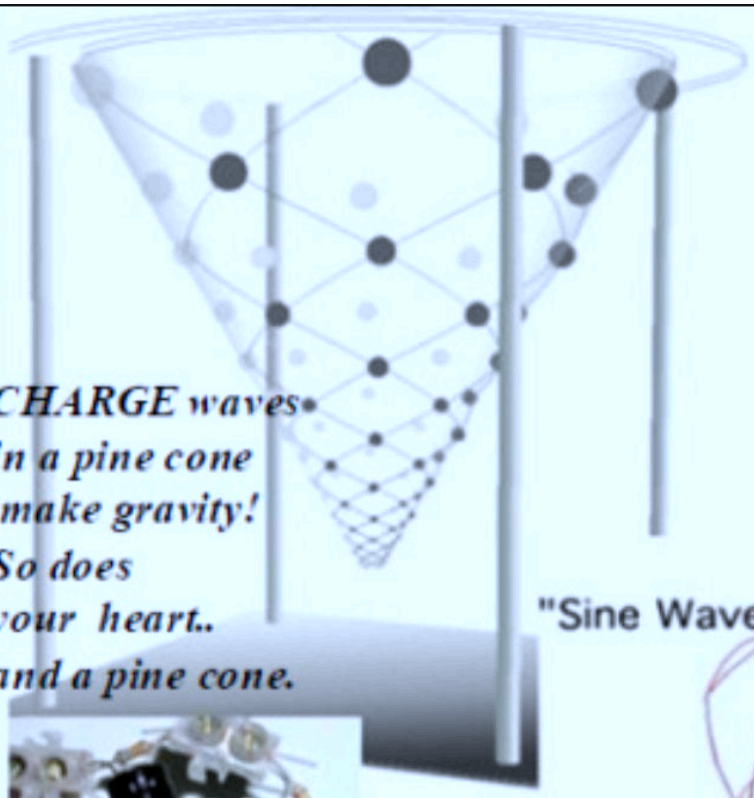
8 x .618 ≈ 5	34 x .618 = 21	144 x .618 = 89



Quantum World: Awaken Your Mind

*Some images not to scale.



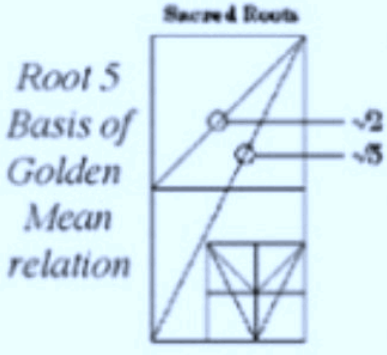
CHARGE waves in a pine cone make gravity! So does your heart.. and a pine cone.

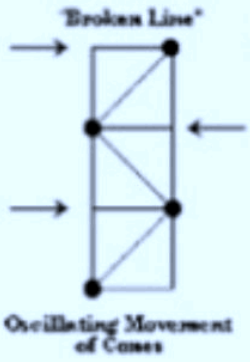
"Sine Waves"

Here in the top down view of you DNA.. we see GOLDEN MEAN turning COMPRESSION in to ACCELERATION.

GOLDEN MEAN RATIO

PERMITS ADDING AND MULTIPLYING OF WAVES





Epyptian Djed

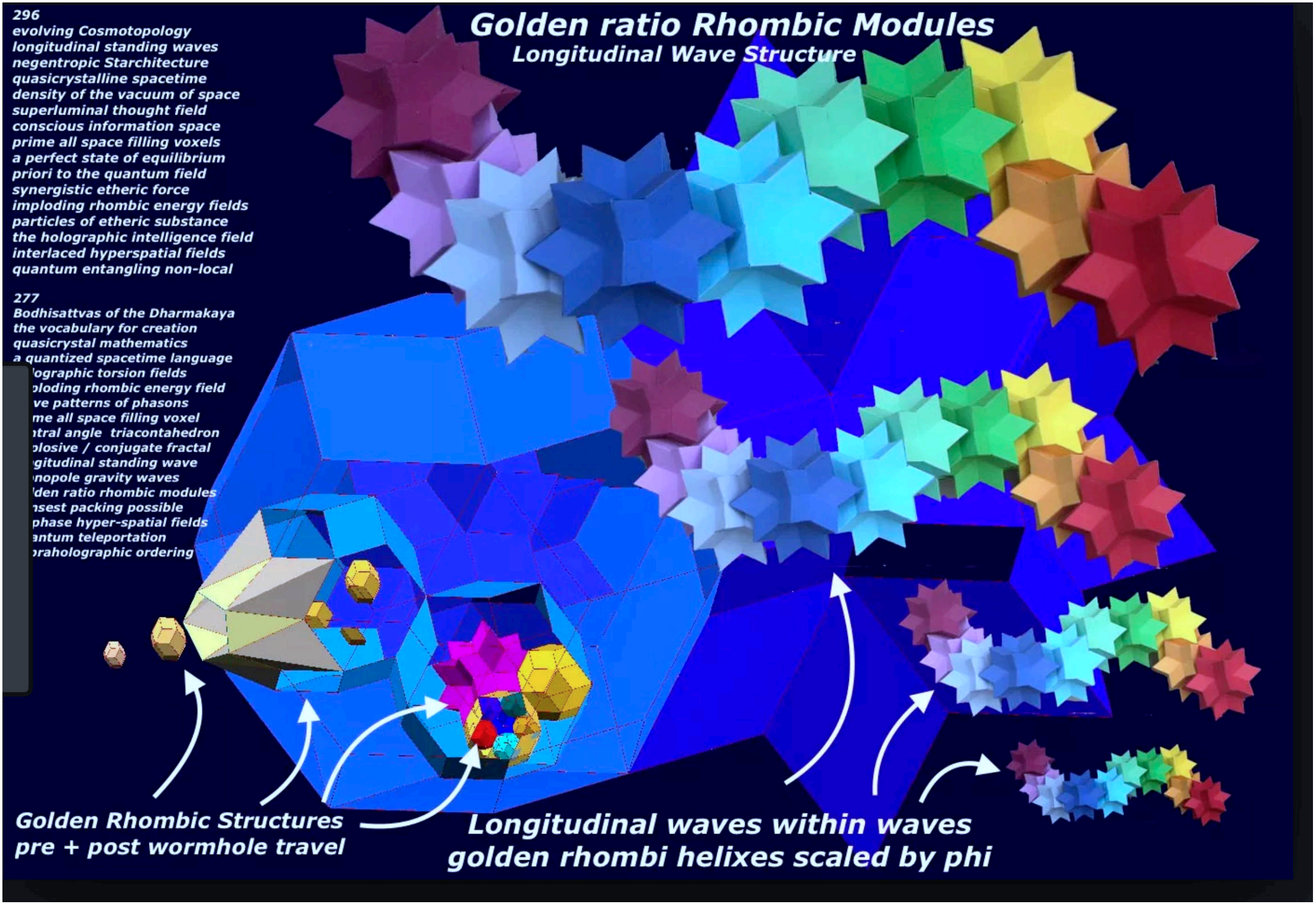
French "Naudin" Gravity Thrust Device - by Capacitors Arranged in Cone

Originally inspired by the geometry Of Egyptian Concept "Djed"

Also: 'Mygdala': To TOWER

Raising of the Djed - versus- Djedai Knight..

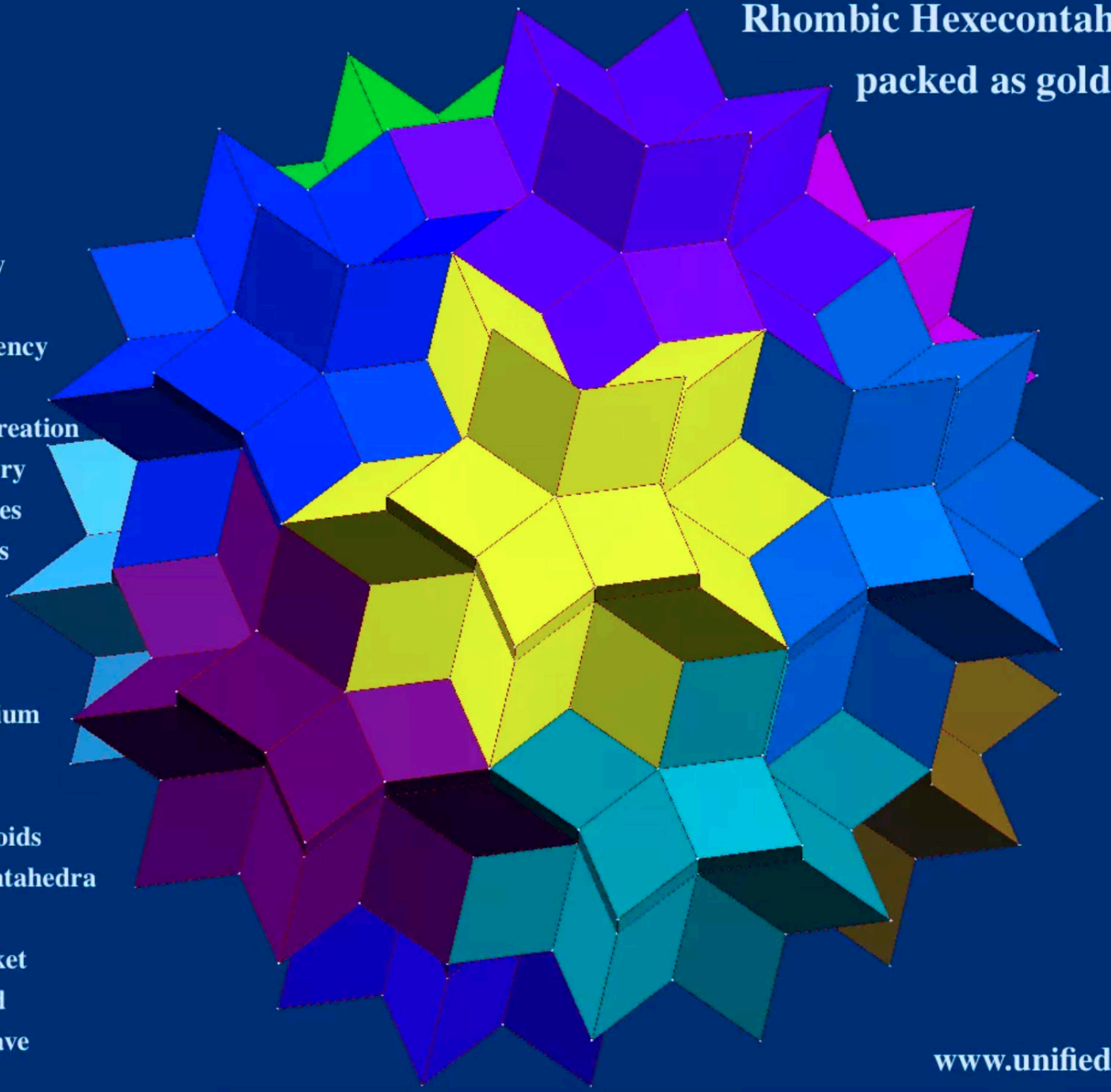
Compare to Sword and the Stone... Creating ~Vertical Component To Magnetism originally in rotation.. (Golden Ratio Path - Translates Vorticity from Circle to LINE..)


296
evolving Cosmotopology
longitudinal standing waves
negentropic Starchitecture
quasicrystalline spacetime
density of the vacuum of space
superluminal thought field
conscious information space
prime all space filling voxels
a perfect state of equilibrium
priori to the quantum field
synergistic etheric force
imploding rhombic energy fields
particles of etheric substance
the holographic intelligence field
interlaced hyperspatial fields
quantum entangling non-local
277
Bodhisattvas of the Dharmakaya
the vocabulary for creation
quasicrystal mathematics
a quantized spacetime language
ographic torsion fields
loding rhombic energy field
ve patterns of phasons
me all space filling voxel
tral angle triacontahedron
losive / conjugate fractal
gitudinal standing wave
nopole gravity waves
den ratio rhombic modules
sest packing possible
phase hyper-spatial fields
antum teleportation
raholographic ordering
Golden ratio Rhombic Modules
Longitudinal Wave Structure
Golden Rhombic Structures
pre + post wormhole travel
Longitudinal waves within waves
golden rhombi helixes scaled by phi

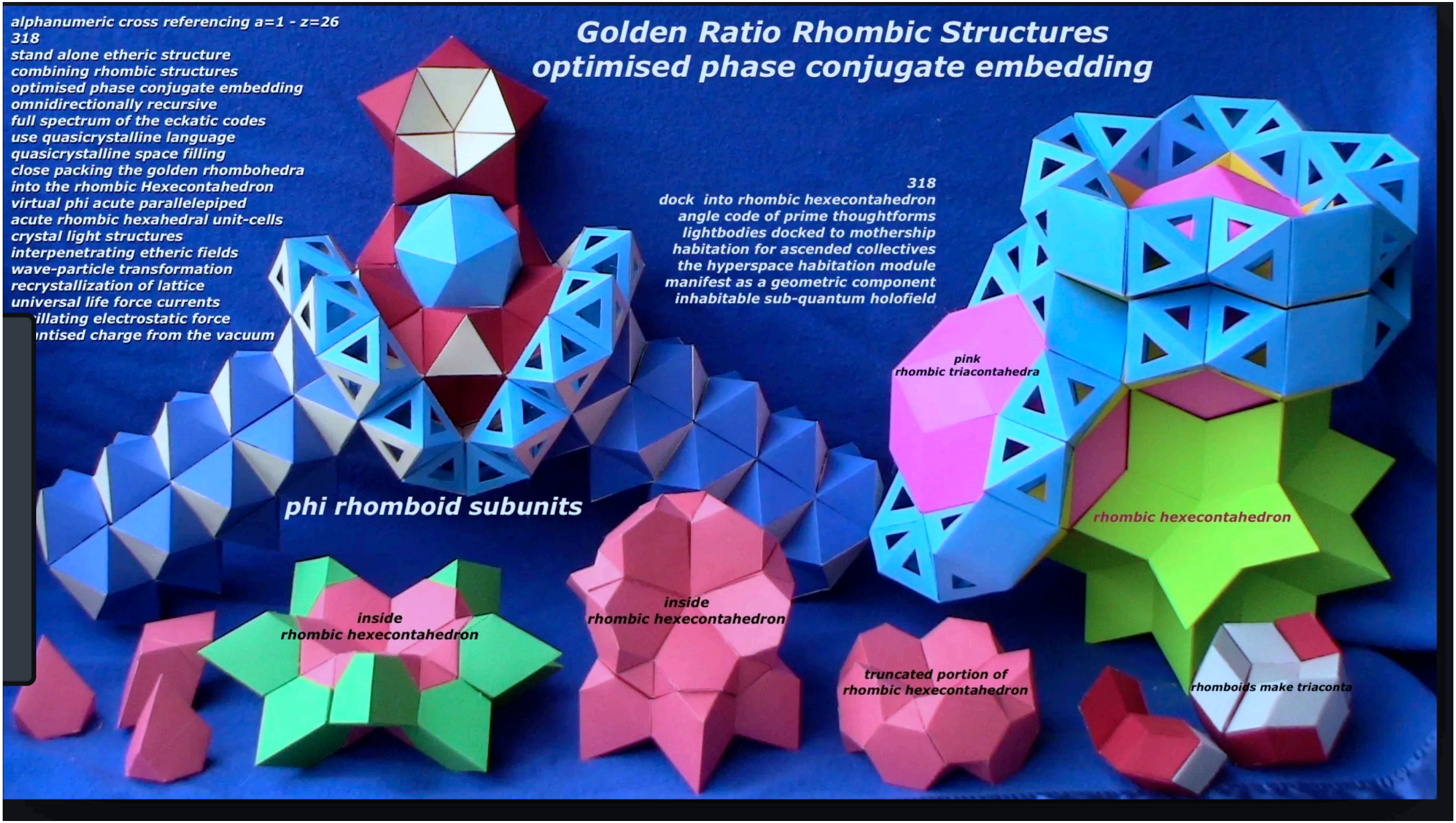
Rhombic Hexecontahedral clusters packed as golden rhomboids

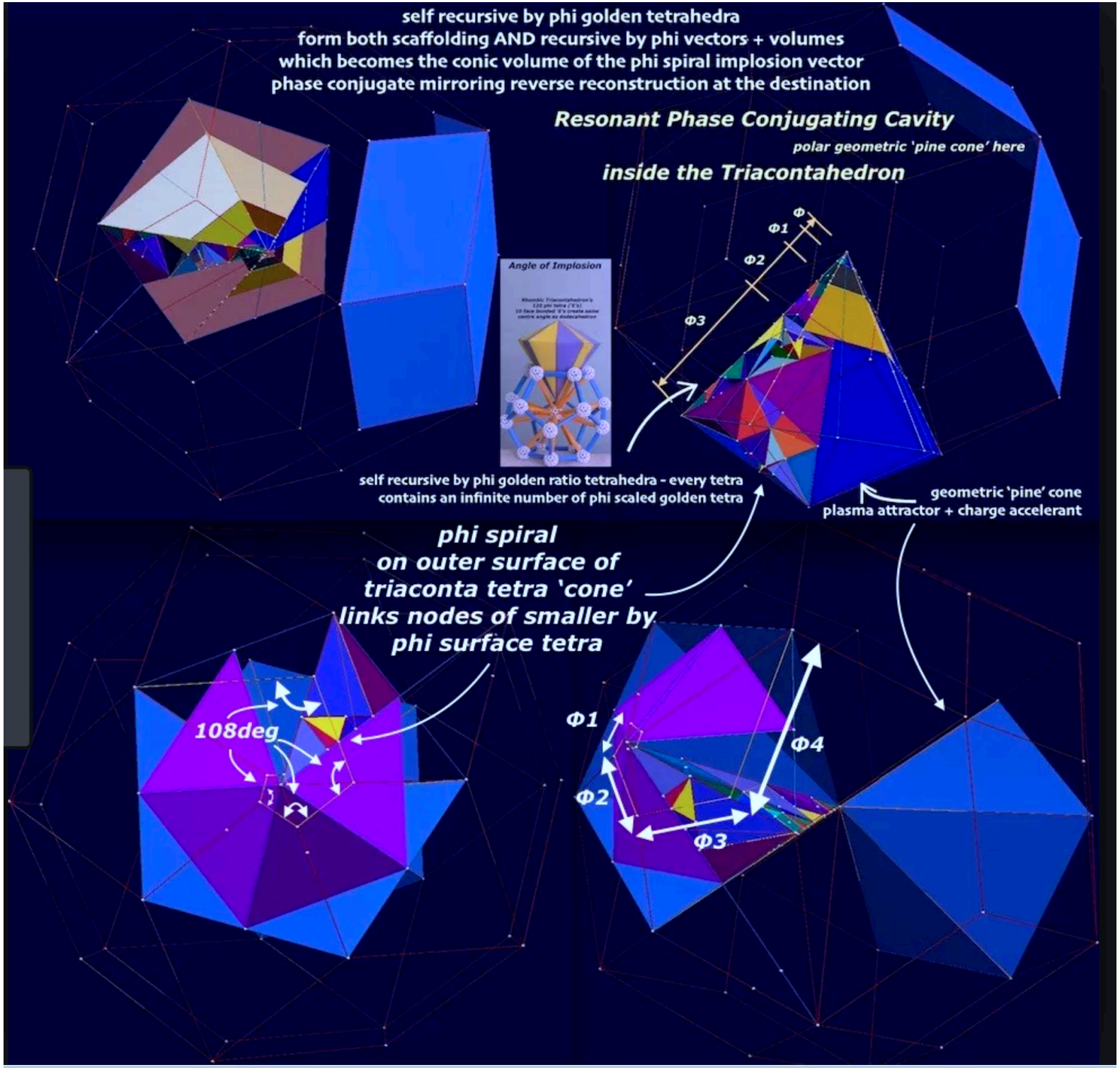
alphanumeric a1 - z26
cross referencing

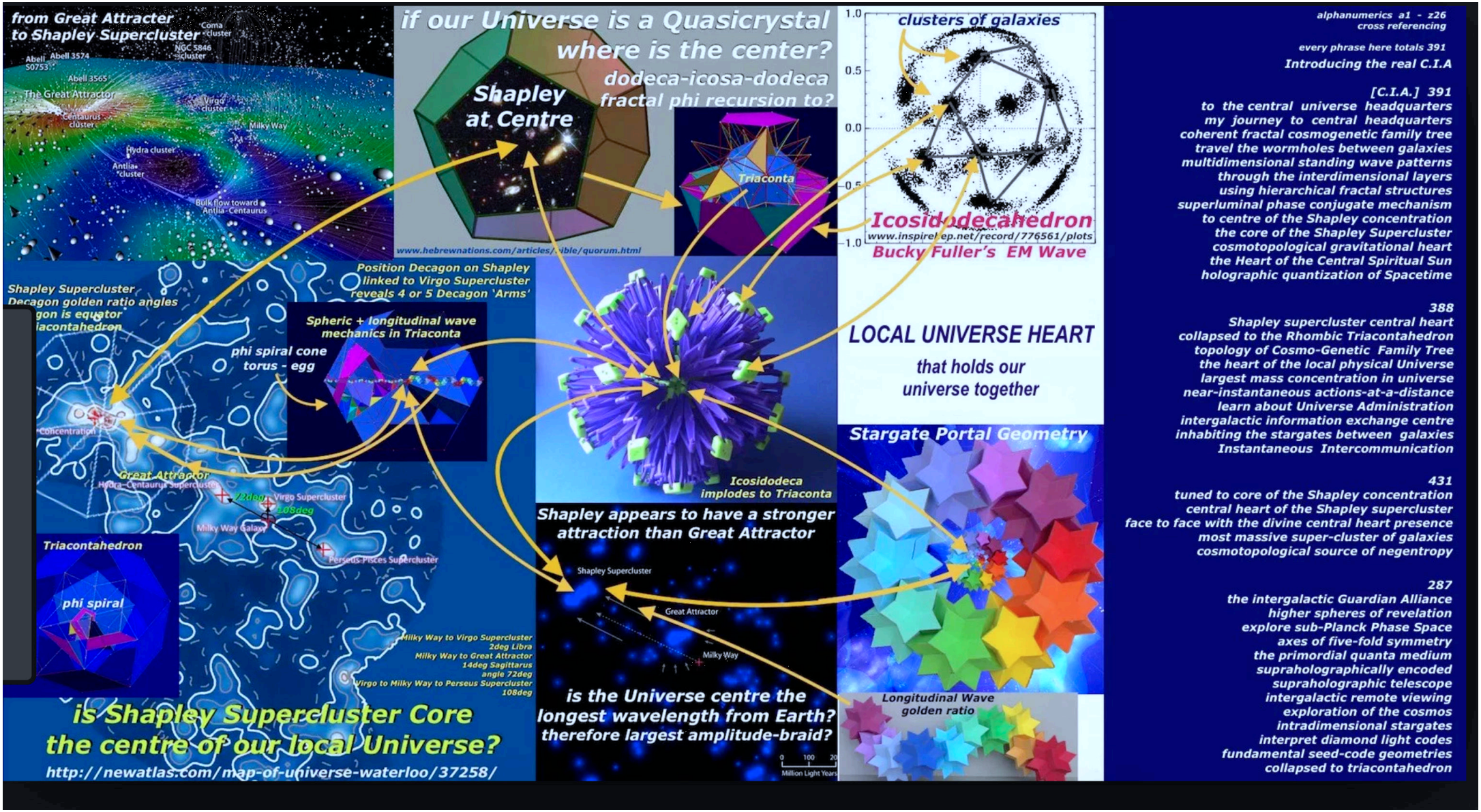
256
grand unification theory
source consciousness
maximal symbolic efficiency
school for starchitects
fundamental fabric of creation
nified fractal field theory
ausal primary axis codes
olden ratio wavelengths
ological multiverse
ndamental structure
chyon quasiparticles
rimordial quanta medium
ecursive wave matrix
onstitution of ether
eld of phi ratio rhomboids
golden rhombic hexecontahedra
quasi liquid crystals
sub-quantum wave-packet
the unity creational field
initiate omni-radiant wave



www.unifiedfractalfield.com


alphanumeric cross referencing a=1 - z=26
318
stand alone etheric structure
combining rhombic structures
optimised phase conjugate embedding
omnidirectionally recursive
full spectrum of the eckatic codes
use quasicrystalline language
quasicrystalline space filling
close packing the golden rhombohedra
into the rhombic Hexecontahedron
virtual phi acute parallelepiped
acute rhombic hexahedral unit-cells
crystal light structures
interpenetrating etheric fields
wave-particle transformation
recrystallization of lattice
universal life force currents
illating electrostatic force
ntised charge from the vacuum
Golden Ratio Rhombic Structures
optimised phase conjugate embedding
318
dock into rhombic hexecontahedron
angle code of prime thoughtforms
lightbodies docked to mothership
habitation for ascended collectives
the hyperspace habitation module
manifest as a geometric component
inhabitable sub-quantum holofield
pink
rhombic triacontahedra
phi rhomboid subunits
rhombic hexecontahedron
inside
rhombic hexecontahedron
inside
rhombic hexecontahedron
truncated portion of
rhombic hexecontahedron
rhomboids make triaconta


self recursive by phi golden tetrahedra
form both scaffolding AND recursive by phi vectors + volumes
which becomes the conic volume of the phi spiral implosion vector
phase conjugate mirroring reverse reconstruction at the destination
Resonant Phase Conjugating Cavity
polar geometric 'pine cone' here
inside the Triacontahedron
Angle of Implosion
Φ
Φ1
Φ2
Φ3
self recursive by phi golden ratio tetrahedra - every tetra
contains an infinite number of phi scaled golden tetra
geometric 'pine' cone
plasma attractor + charge accelerant
phi spiral
on outer surface of
triaconta tetra 'cone'
links nodes of smaller by
phi surface tetra
108deg
Φ1
Φ4
Φ2
Φ3



alphanumerics a1 - z26
cross referencing

every phrase here totals 391

Introducing the real C.I.A

[C.I.A.] 391
to the central universe headquarters
my journey to central headquarters
coherent fractal cosmogenetic family tree
travel the wormholes between galaxies
multidimensional standing wave patterns
through the interdimensional layers
using hierarchical fractal structures
superluminal phase conjugate mechanism
to centre of the Shapley concentration
the core of the Shapley Supercluster
cosmotopological gravitational heart
the Heart of the Central Spiritual Sun
holographic quantization of Spacetime

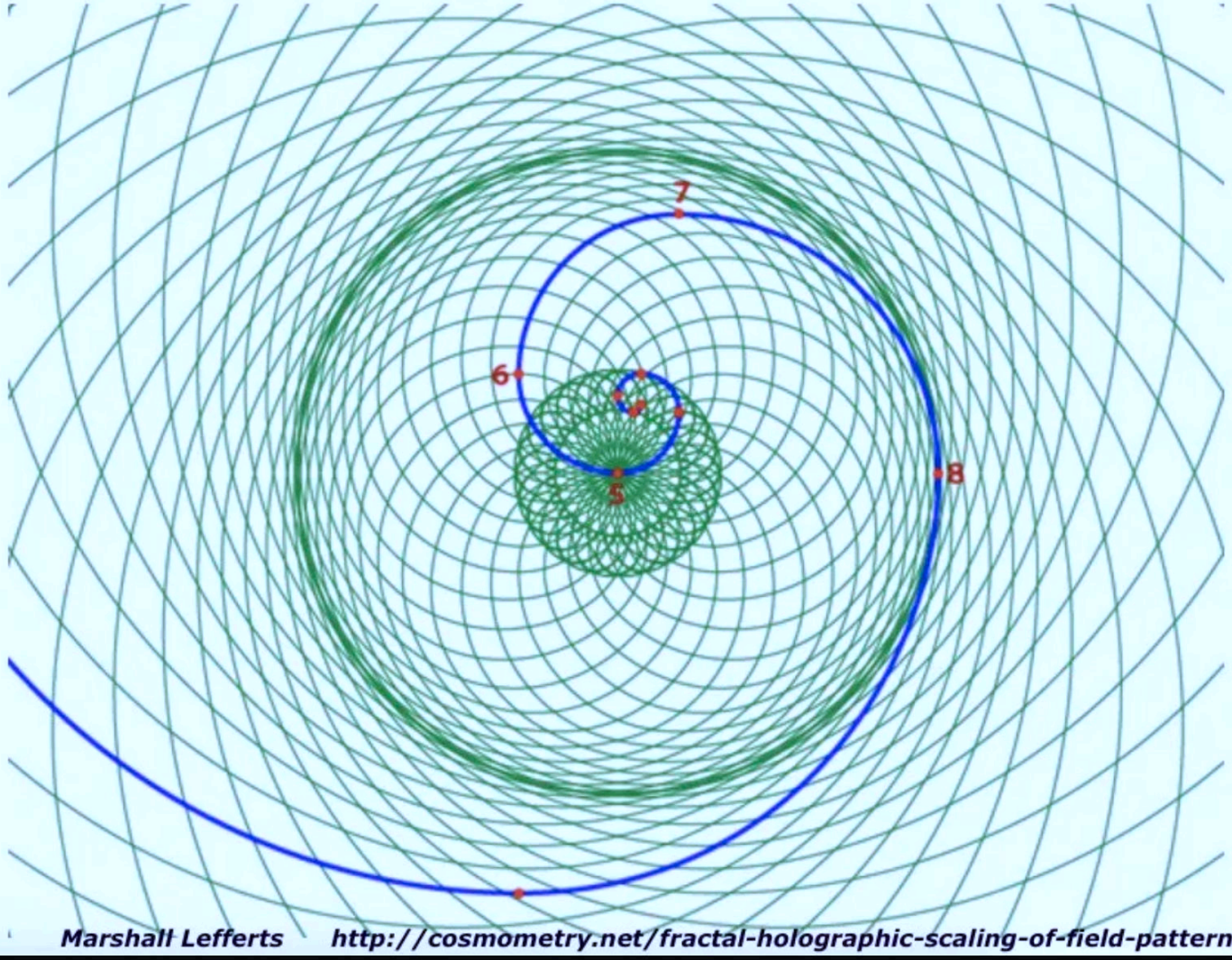
388
Shapley supercluster central heart
collapsed to the Rhombic Triacontahedron
topology of Cosmo-Genetic Family Tree
the heart of the local physical Universe
largest mass concentration in universe
near-instantaneous actions-at-a-distance
learn about Universe Administration
intergalactic information exchange centre
inhabiting the stargates between galaxies
Instantaneous Intercommunication

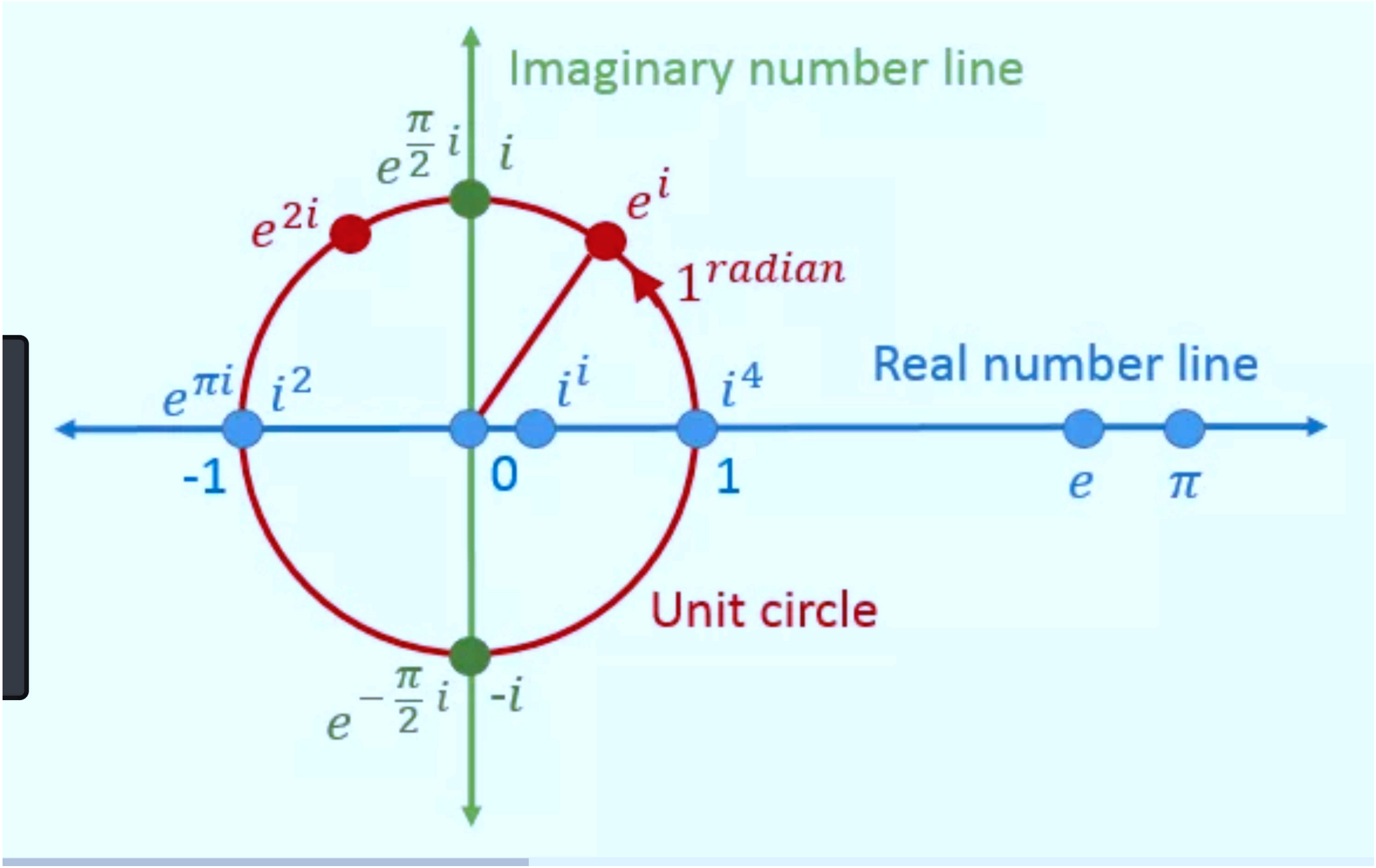
431
tuned to core of the Shapley concentration
central heart of the Shapley supercluster
face to face with the divine central heart presence
most massive super-cluster of galaxies
cosmotopological source of negentropy

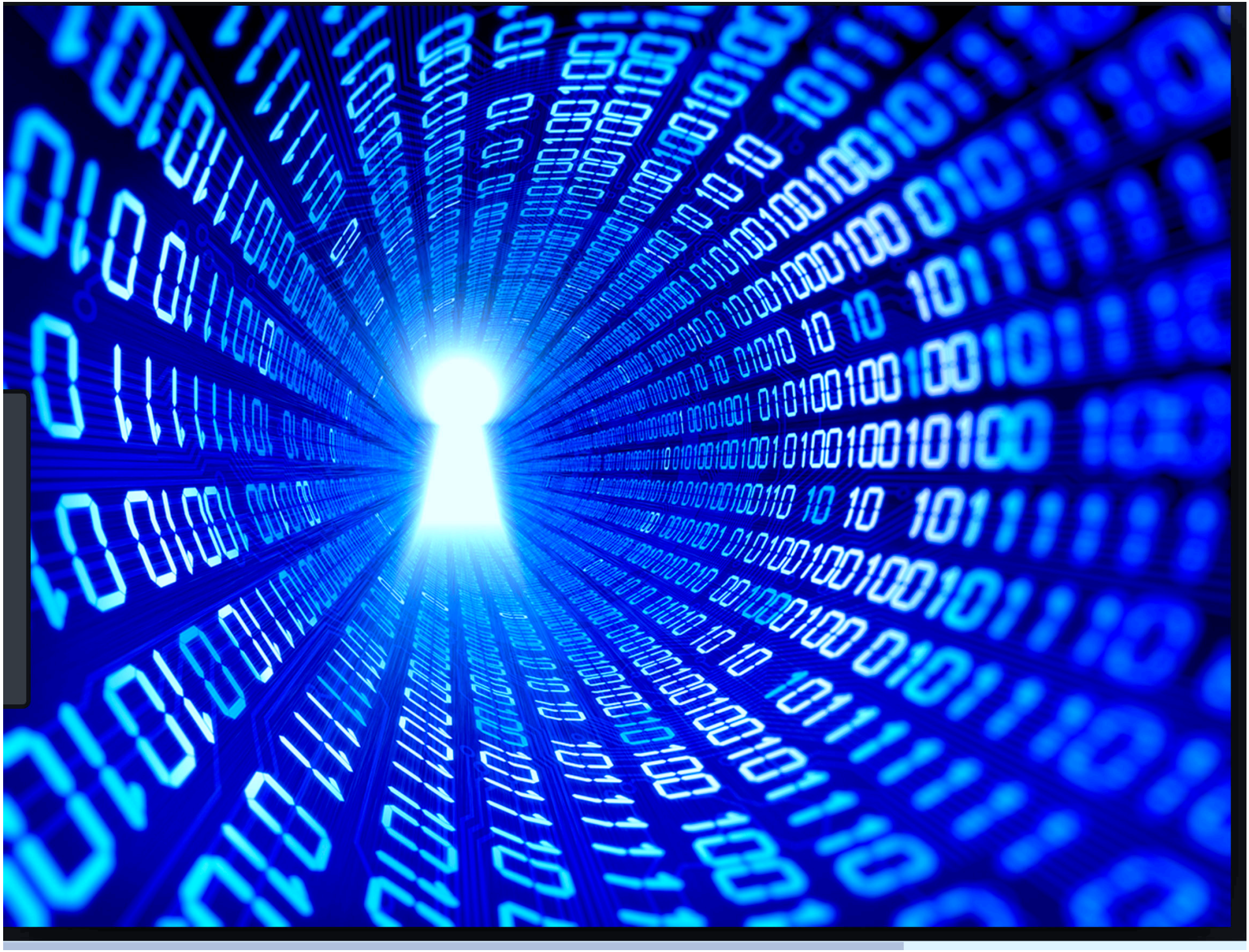
287
the intergalactic Guardian Alliance
higher spheres of revelation
explore sub-Planck Phase Space
axes of five-fold symmetry
the primordial quanta medium
supraholographically encoded
supraholographic telescope
intergalactic remote viewing
exploration of the cosmos
intradimensional stargates
interpret diamond light codes
fundamental seed-code geometries
collapsed to triacontahedron

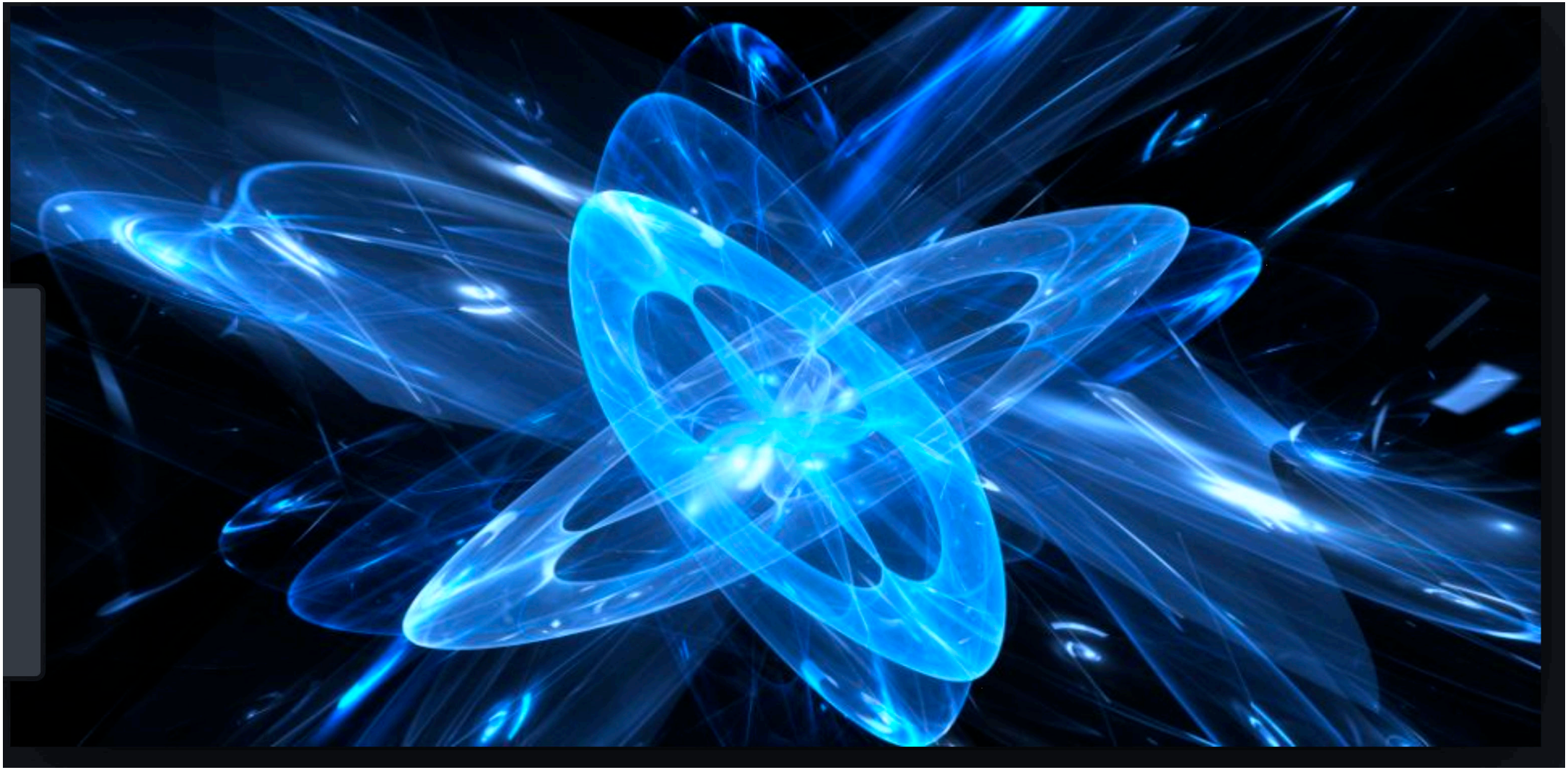
Fractal-Holographic Scaling of Field Patterns

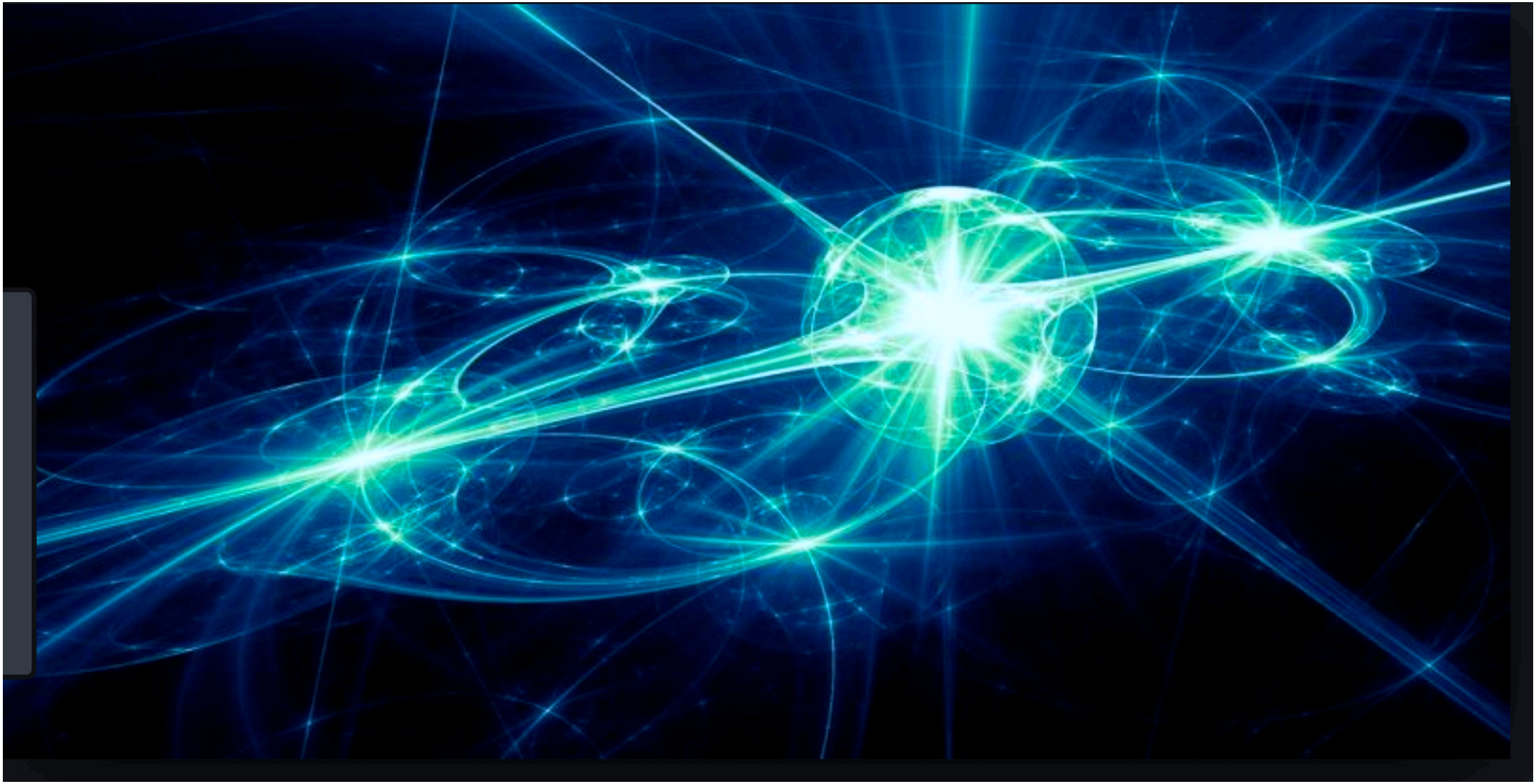
To verify that the phi ratio is fractal-holographic in nature it should be possible to use any node on the phi spiral as the center point around which the spiral is rotated and observe the same boundary condition phenomenon arising exactly 3 nodes out from the center. This is in fact the case. **Illustration 6** shows the same spiral as in **Illustration 5**, this time spun with Node 5 as the center point rather than Node 4. A boundary arises exactly at Node 8.

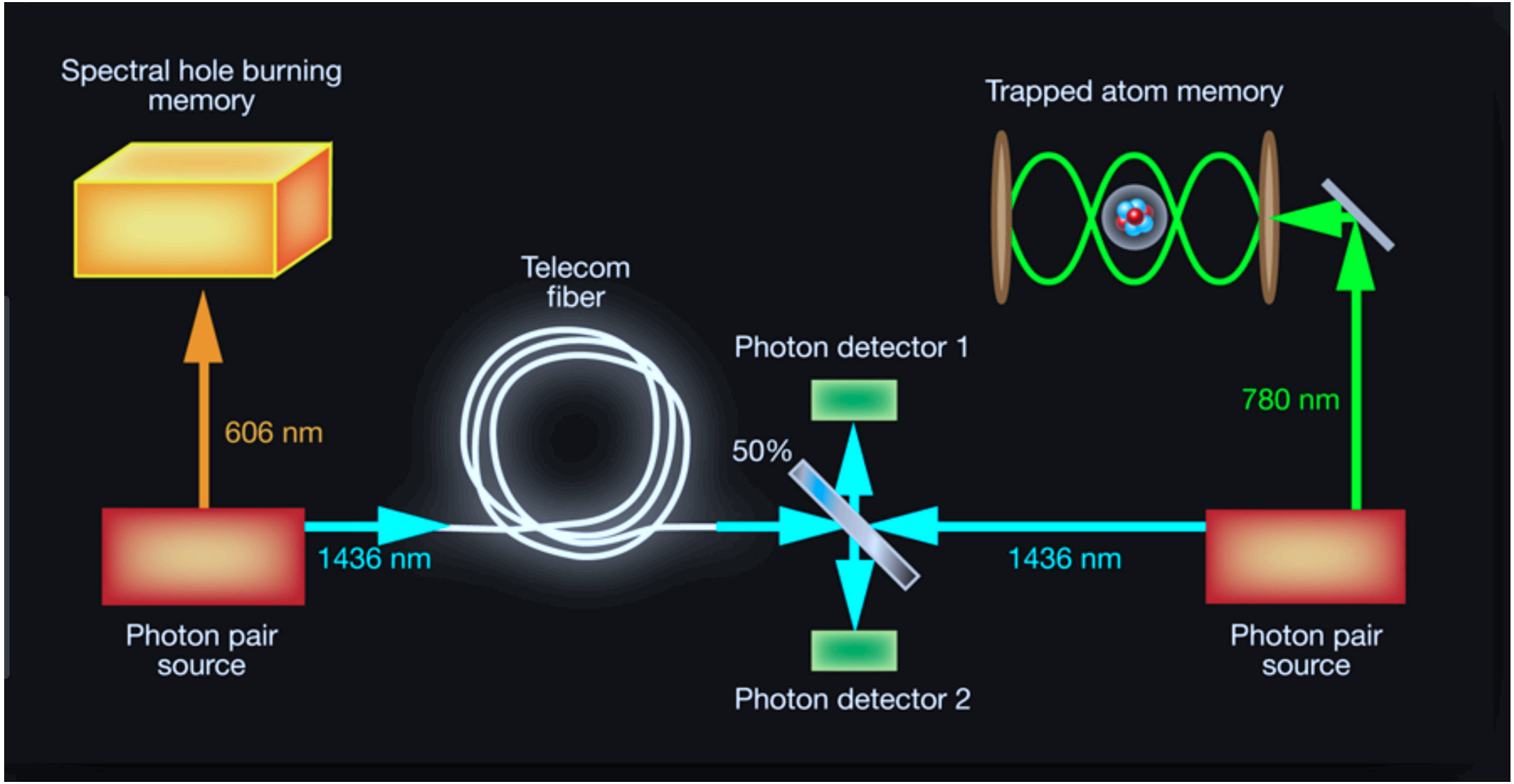



Imaginary number line
$e^{\frac{\pi}{2}i}$
i
e^{2i}
e^{i}
1^{radian}
$e^{\pi i}$
i^{2}
i^{i}
i^{4}
Real number line
-1
0
1
e
π
Unit circle
$e^{-\frac{\pi}{2}i}$
$-i$








Spectral hole burning memory
Trapped atom memory
Telecom fiber
Photon detector 1
606 nm
780 nm
50%
1436 nm
1436 nm
Photon pair source
Photon pair source
Photon detector 2

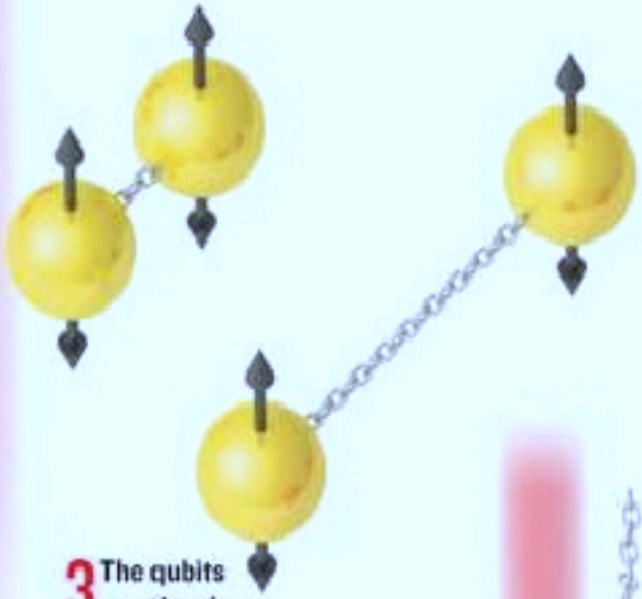
Quantum Entanglement

UNLIKE ORDINARY BITS of information, qubits can be linked in a way that has no analog in the digital world. This linkage, called entanglement, acts instantaneously over any distance.

LASER

1 Two qubits are entangled through the action of a laser.

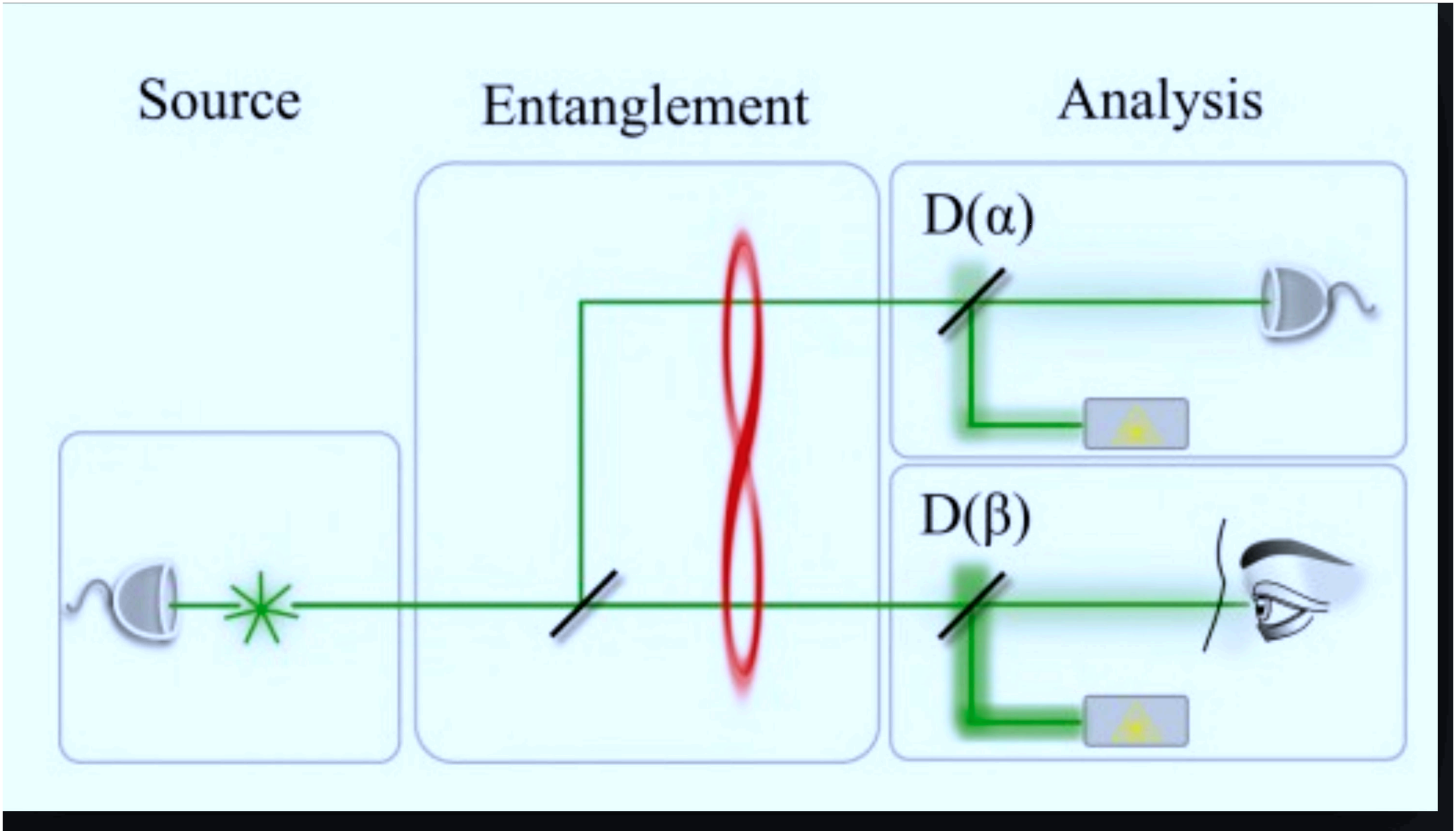
2 Once they have been entangled, they are in an indeterminate state.

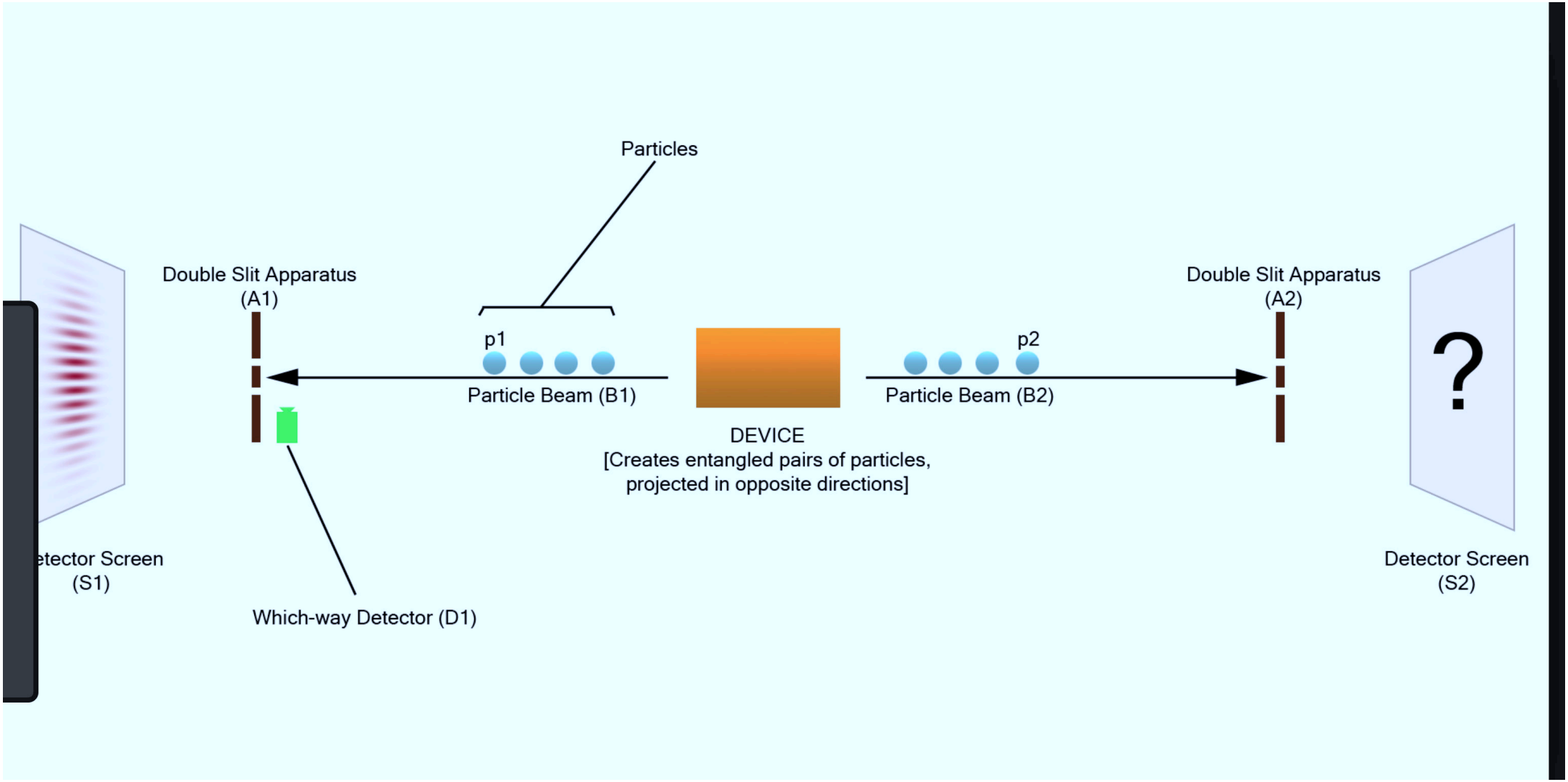


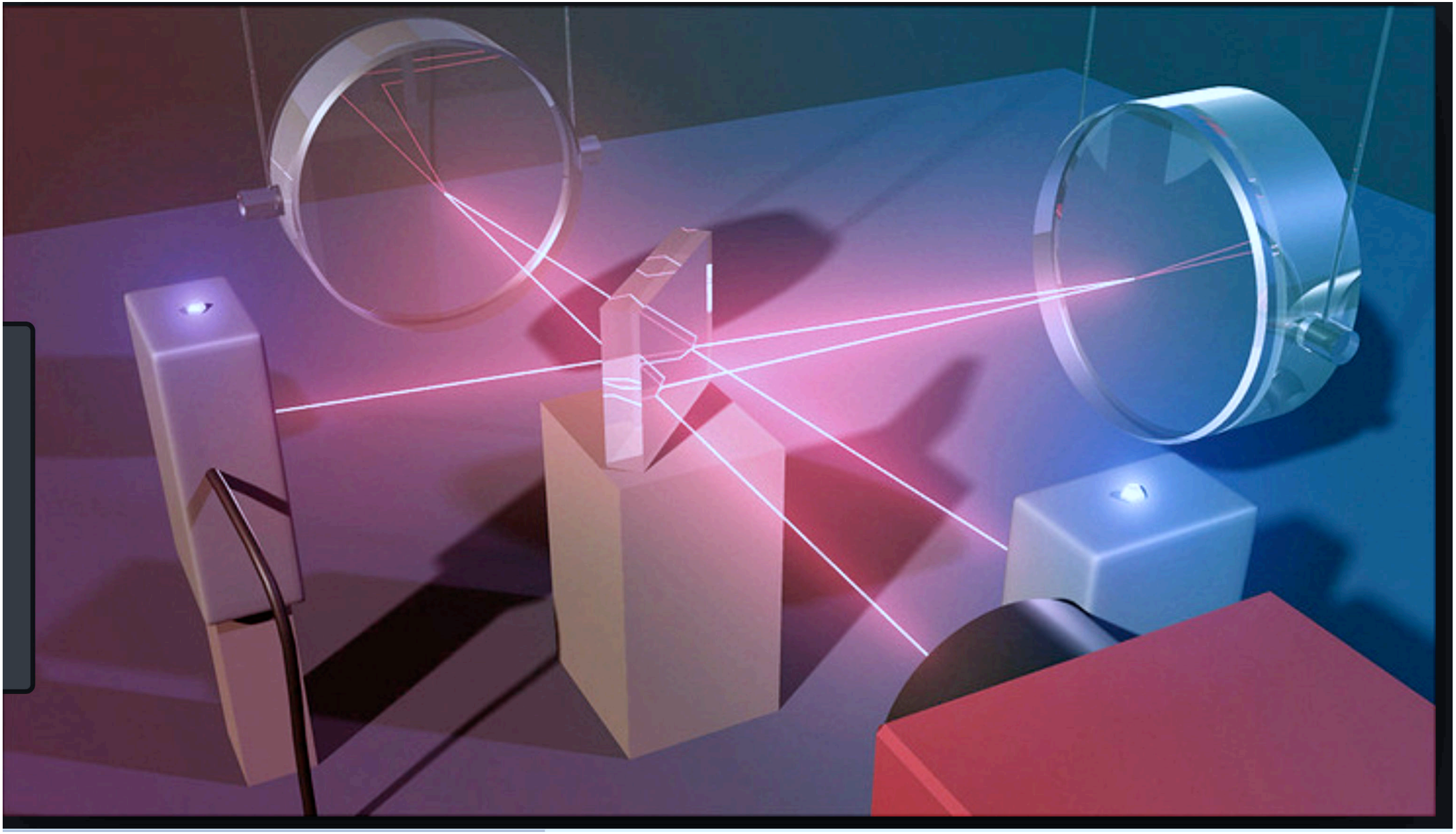
3 The qubits can then be separated by any distance, but they will remain linked.

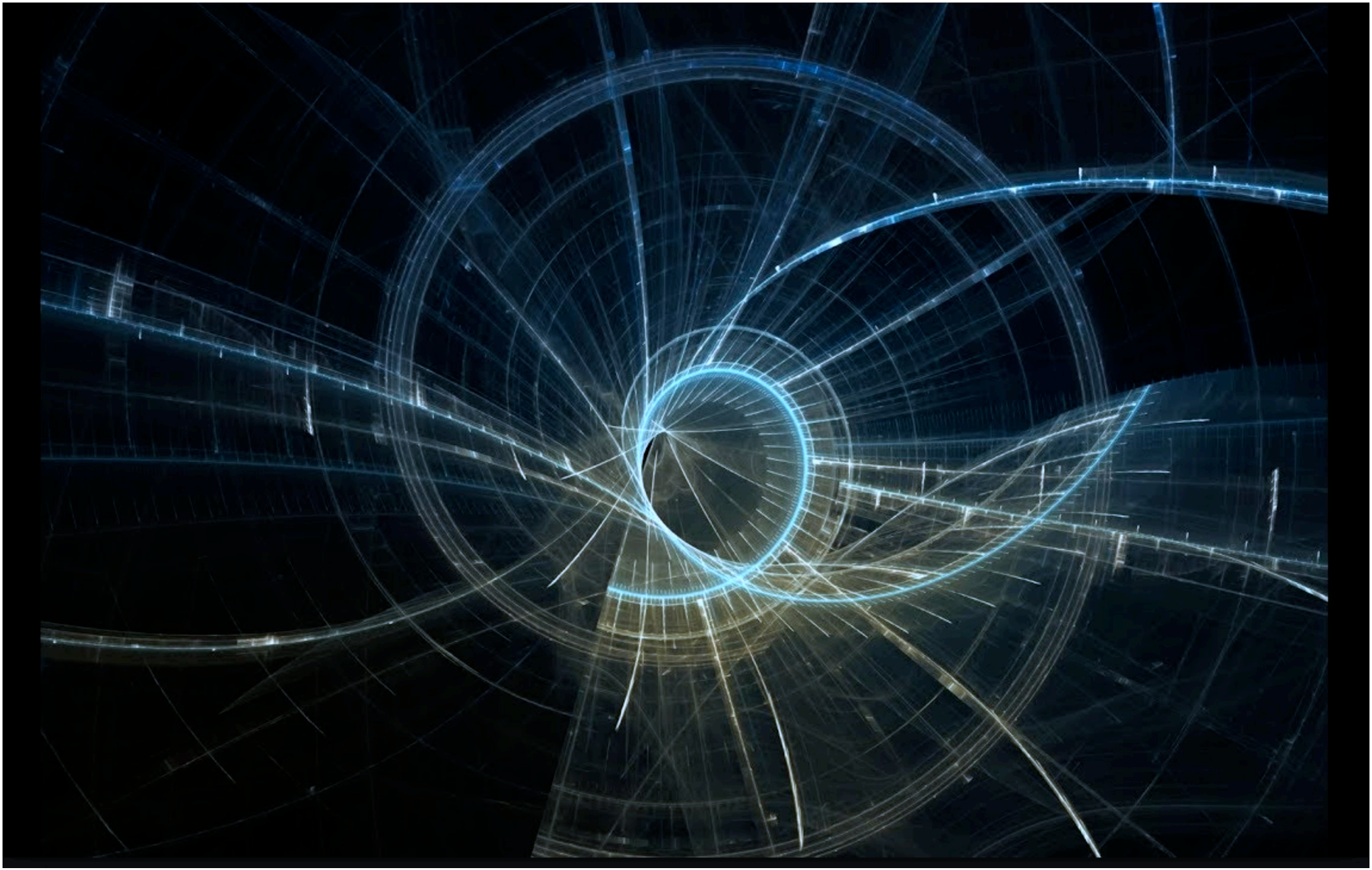
4 When one of the qubits is manipulated—say, to perform a step in a quantum computer program—the manipulation happens instantly to its entangled twin as well.

5 If the manipulation includes reading the state of one of the qubits, the entanglement ends, and both qubits' states are revealed.

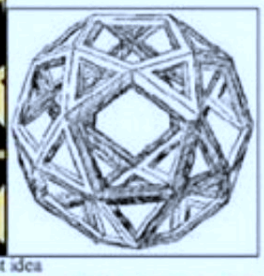

Source
Entanglement
Analysis
D(α)
D(β)


Particles
Double Slit Apparatus
(A1)
p1
Particle Beam (B1)
DEVICE
[Creates entangled pairs of particles,
projected in opposite directions]
p2
Particle Beam (B2)
Double Slit Apparatus
(A2)
?
etector Screen
(S1)
Which-way Detector (D1)
Detector Screen
(S2)





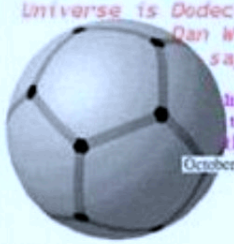
Universe Is Dodecahedral! Makes Headlines.. Nature Magazine etc., ..BUT - no one even NOTICED that this is the only 3D geometry (based) on Golden Mean - whose stellation precisely allows infinite non-destructive collpase - the compression that PRODUCES acceleration (gravity). Summary - the very dodeca symmetry of the universe PROVES that self-similarity produces gravity. ref: fusion , collapse , thrust



Leonardo da Vinci had the right idea

An image showing the view in a dodecahedral space universe (image credit: Jeff Weeks)

Universe is Dodeca - or Universe is Fractal
Dan Winter goldenmean.info
says they are BOTH right..
because that perfect collapse geometry CAUSES gravity!



In other words- the more a set of masses is arranged in DODECA SYMMETRY the more gravity they will create! - We should be able to use this to eliminate the need to hypothesize the need for implossible 'dark matter'.

October 2003 **Is the universe a dodecahedron?** (ref: http://physicsweb.org/article/news/7/10/5#polygon) .8

The standard model of cosmology predicts that the universe is infinite and flat. However, cosmologists in France and the US are now suggesting that space could be finite and shaped like a dodecahedron instead. They claim that a universe with the same shape as the twelve-sided polygon can explain measurements of the cosmic microwave background - the radiation left over from the big bang - that spaces with more mundane shapes cannot (J-P Luminet *et al.* 2003 *Nature* 425 593).

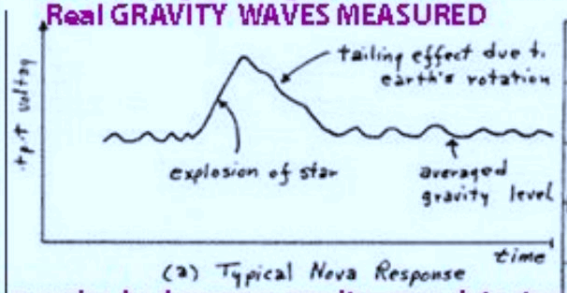
Fig. 3.- Spherical pentagons and dodecahedra fit snugly, unlike their Euclidean counterparts. a) Twelve spherical pentagons tile the surface of an ordinary sphere. They fit together snugly because their corner angles are exactly 120°. Note that each spherical pentagon is just a pentagonal piece of a sphere. b) One hundred twenty spherical dodecahedra tile the surface of a hypersphere. A hypersphere is the 3-dimensional surface of a 4-dimensional ball. Note that each spherical dodecahedron is just a dodecahedral piece of a hypersphere. The spherical dodecahedra fit together snugly because their edge angles are exactly 120°. In the construction of the Poincar´e dodecahedral space the dodecahedron's 30 edges come together in ten groups of three edges each, forcing the dihedral angles to be 120° and requiring a spherical dodecahedron rather than a Euclidean one. Software for visualising spherical dodecahedra and the Poincar´e dodecahedral space is available for free download from www.geometrygames.org/CurvedSpaces.

New Scientist - 10 March 2007

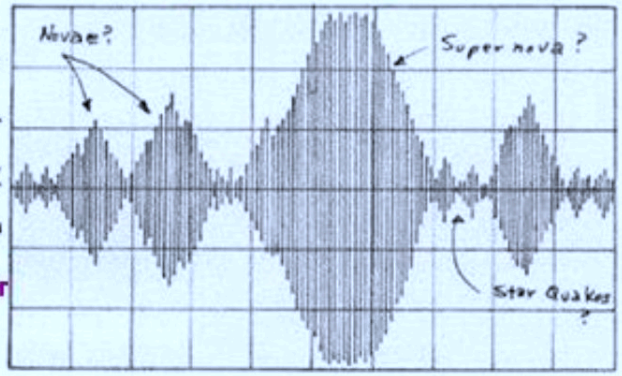
So-Nature Magazine says the UNIVERSE IS FRACTAL,
New Scientist & physicsweb says- The UNIVERSE IS DODECAHEDRAL
- Can they BOTH be right? Yes! A Stellated Dodec IS the Perfect Fractal, AND
- that PERFECT COLLAPSE GEOMETRY FOR CHARGE IS THE CAUSE OF GRAVITY!

centers of mass- at golden ratio / dodeca array (KNOWN for the geometry of the universe) will INCREASE the gravity- - thus proving phase conjugation causes gravity - and eliminating the need for the spurious unproven idea about dark matter- These conjugate longitudinals- are the mechanism of gravity and biologic radio

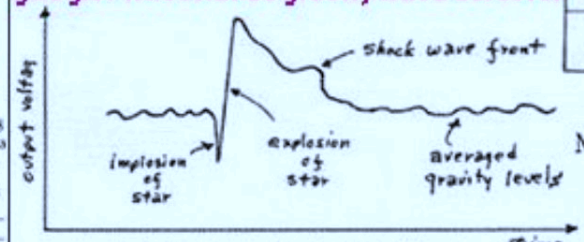
Real GRAVITY WAVES MEASURED



(a) Typical Nova Response

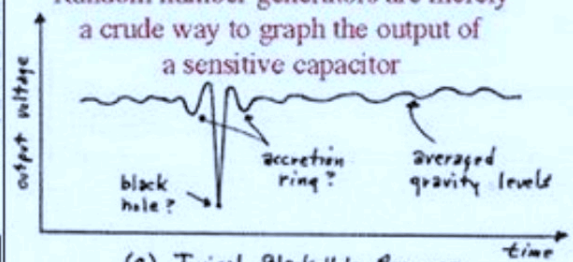


google: hodowanec gravity wave detector



(b) Typical Supernova Response

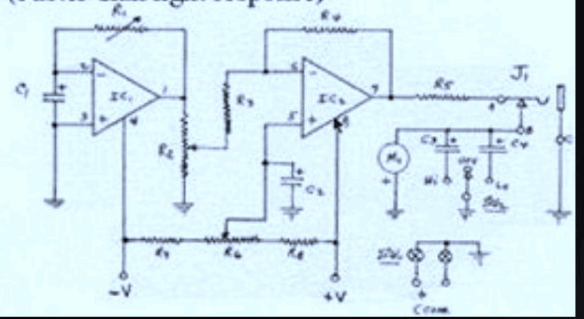
Random number generators are merely a crude way to graph the output of a sensitive capacitor

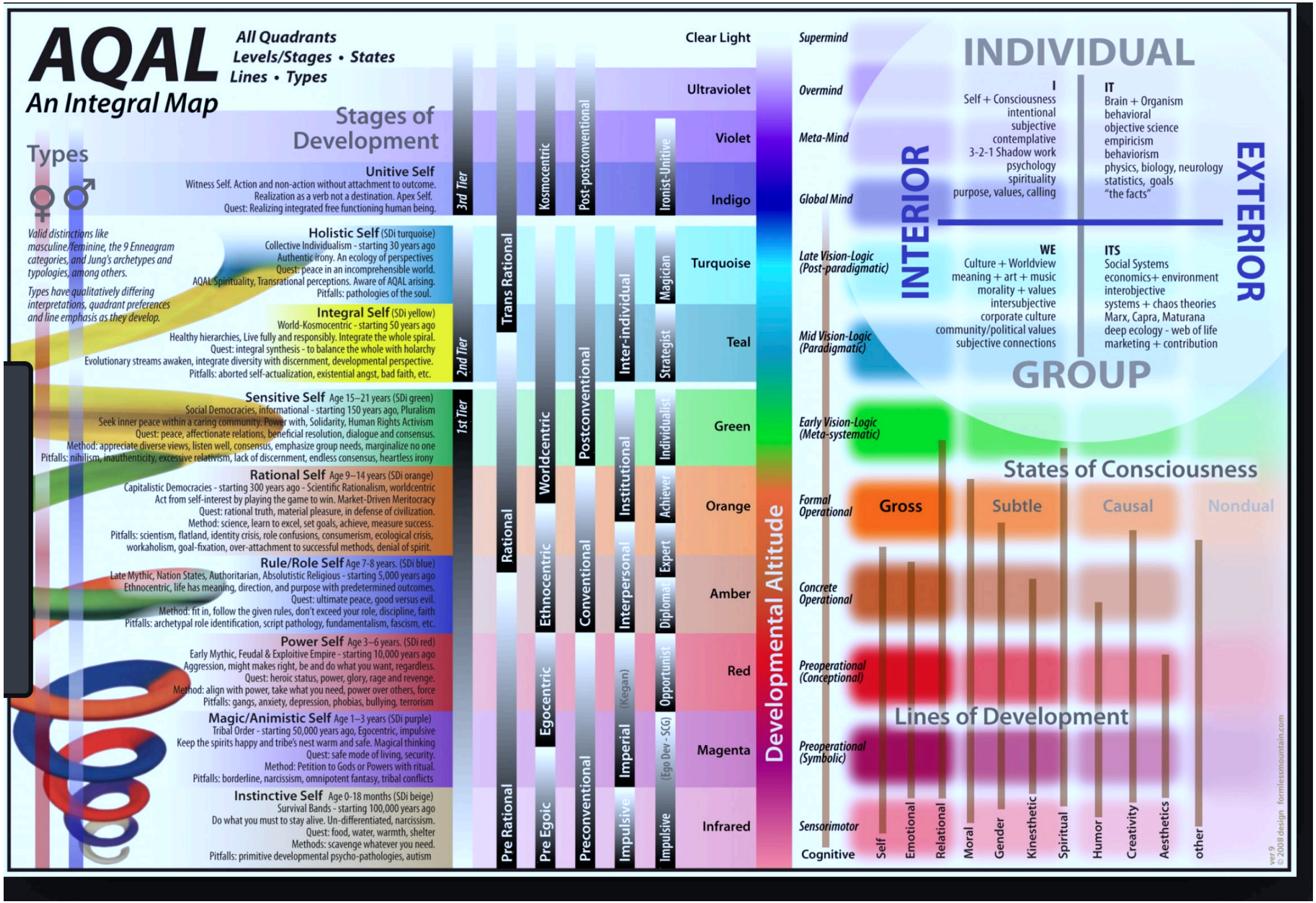


(c) Typical Black Hole Response

Hodowanec / Ramsey
Measuring Stellar Gravity Events
With Capacitors
Replaces Telescopes
(Faster than light response)

Vert 0.5V/cm
Horizontal 20m /cm
Ring 550 cps




AQAL
All Quadrants
Levels/Stages • States
Lines • Types
An Integral Map
Stages of Development
Types
♀ ♂
Valid distinctions like masculine/feminine, the 9 Enneagram categories, and Jung's archetypes and typologies, among others.
Types have qualitatively differing interpretations, quadrant preferences and line emphasis as they develop.
Unitive Self
Witness Self. Action and non-action without attachment to outcome.
Realization as a verb not a destination. Apex Self.
Quest: Realizing integrated free functioning human being.
Holistic Self (SDi turquoise)
Collective Individualism - starting 30 years ago
Authentic irony. An ecology of perspectives
Quest: peace in an incomprehensible world.
AQAL Spirituality, Transrational perceptions. Aware of AQAL arising.
Pitfalls: pathologies of the soul.
Integral Self (SDi yellow)
World-Kosmocentric - starting 50 years ago
Healthy hierarchies, Live fully and responsibly. Integrate the whole spiral.
Quest: integral synthesis - to balance the whole with holarchy
Evolutionary streams awaken, integrate diversity with discernment, developmental perspective.
Pitfalls: aborted self-actualization, existential angst, bad faith, etc.
Sensitive Self Age 15–21 years (SDi green)
Social Democracies, informational - starting 150 years ago, Pluralism
Seek inner peace within a caring community. Power with, Solidarity, Human Rights Activism
Quest: peace, affectionate relations, beneficial resolution, dialogue and consensus.
Method: appreciate diverse views, listen well, consensus, emphasize group needs, marginalize no one
Pitfalls: nihilism, inauthenticity, excessive relativism, lack of discernment, endless consensus, heartless irony
Rational Self Age 9–14 years (SDi orange)
Capitalistic Democracies - starting 300 years ago - Scientific Rationalism, worldcentric
Act from self-interest by playing the game to win. Market-Driven Meritocracy
Quest: rational truth, material pleasure, in defense of civilization.
Method: science, learn to excel, set goals, achieve, measure success.
Pitfalls: scientism, flatland, identity crisis, role confusions, consumerism, ecological crisis, workaholism, goal-fixation, over-attachment to successful methods, denial of spirit.
Rule/Role Self Age 7-8 years. (SDi blue)
Late Mythic, Nation States, Authoritarian, Absolutistic Religious - starting 5,000 years ago
Ethnocentric, life has meaning, direction, and purpose with predetermined outcomes.
Quest: ultimate peace, good versus evil.
Method: fit in, follow the given rules, don't exceed your role, discipline, faith
Pitfalls: archetypal role identification, script pathology, fundamentalism, fascism, etc.
Power Self Age 3–6 years. (SDi red)
Early Mythic, Feudal & Exploitive Empire - starting 10,000 years ago
Aggression, might makes right, be and do what you want, regardless.
Quest: heroic status, power, glory, rage and revenge.
Method: align with power, take what you need, power over others, force
Pitfalls: gangs, anxiety, depression, phobias, bullying, terrorism
Magic/Animistic Self Age 1–3 years (SDi purple)
Tribal Order - starting 50,000 years ago, Egocentric, impulsive
Keep the spirits happy and tribe's nest warm and safe. Magical thinking
Quest: safe mode of living, security.
Method: Petition to Gods or Powers with ritual.
Pitfalls: borderline, narcissism, omnipotent fantasy, tribal conflicts
Instinctive Self Age 0-18 months (SDi beige)
Survival Bands - starting 100,000 years ago
Do what you must to stay alive. Un-differentiated, narcissism.
Quest: food, water, warmth, shelter
Methods: scavenge whatever you need.
Pitfalls: primitive developmental psycho-pathologies, autism
3rd Tier
2nd Tier
1st Tier
Trans Rational
Rational
Pre Rational
Kosmocentric
Worldcentric
Ethnocentric
Egocentric
Pre Egoic
Post-postconventional
Postconventional
Conventional
Preconventional
Inter-individual
Institutional
Interpersonal
Imperial (Kegan)
Impulsive
Ironist-Unitive
Magician
Strategist
Individualist
Achiever
Expert
Diplomat
Opportunist
(Ego Dev - SCG)
Impulsive
Clear Light
Ultraviolet
Violet
Indigo
Turquoise
Teal
Green
Orange
Amber
Red
Magenta
Infrared
Developmental Altitude
Supermind
Overmind
Meta-Mind
Global Mind
Late Vision-Logic (Post-paradigmatic)
Mid Vision-Logic (Paradigmatic)
Early Vision-Logic (Meta-systematic)
Formal Operational
Concrete Operational
Preoperational (Conceptional)
Preoperational (Symbolic)
Sensorimotor
Cognitive
INDIVIDUAL
INTERIOR
EXTERIOR
GROUP
I
Self + Consciousness
intentional
subjective
contemplative
3-2-1 Shadow work
psychology
spirituality
purpose, values, calling
IT
Brain + Organism
behavioral
objective science
empiricism
behaviorism
physics, biology, neurology
statistics, goals
"the facts"
WE
Culture + Worldview
meaning + art + music
morality + values
intersubjective
corporate culture
community/political values
subjective connections
ITS
Social Systems
economics+ environment
interobjective
systems + chaos theories
Marx, Capra, Maturana
deep ecology - web of life
marketing + contribution
States of Consciousness
Gross
Subtle
Causal
Nondual
Lines of Development
Self
Emotional
Relational
Moral
Gender
Kinesthetic
Spiritual
Humor
Creativity
Aesthetics
other
ver 9
© 2008 design formlessmountain.com

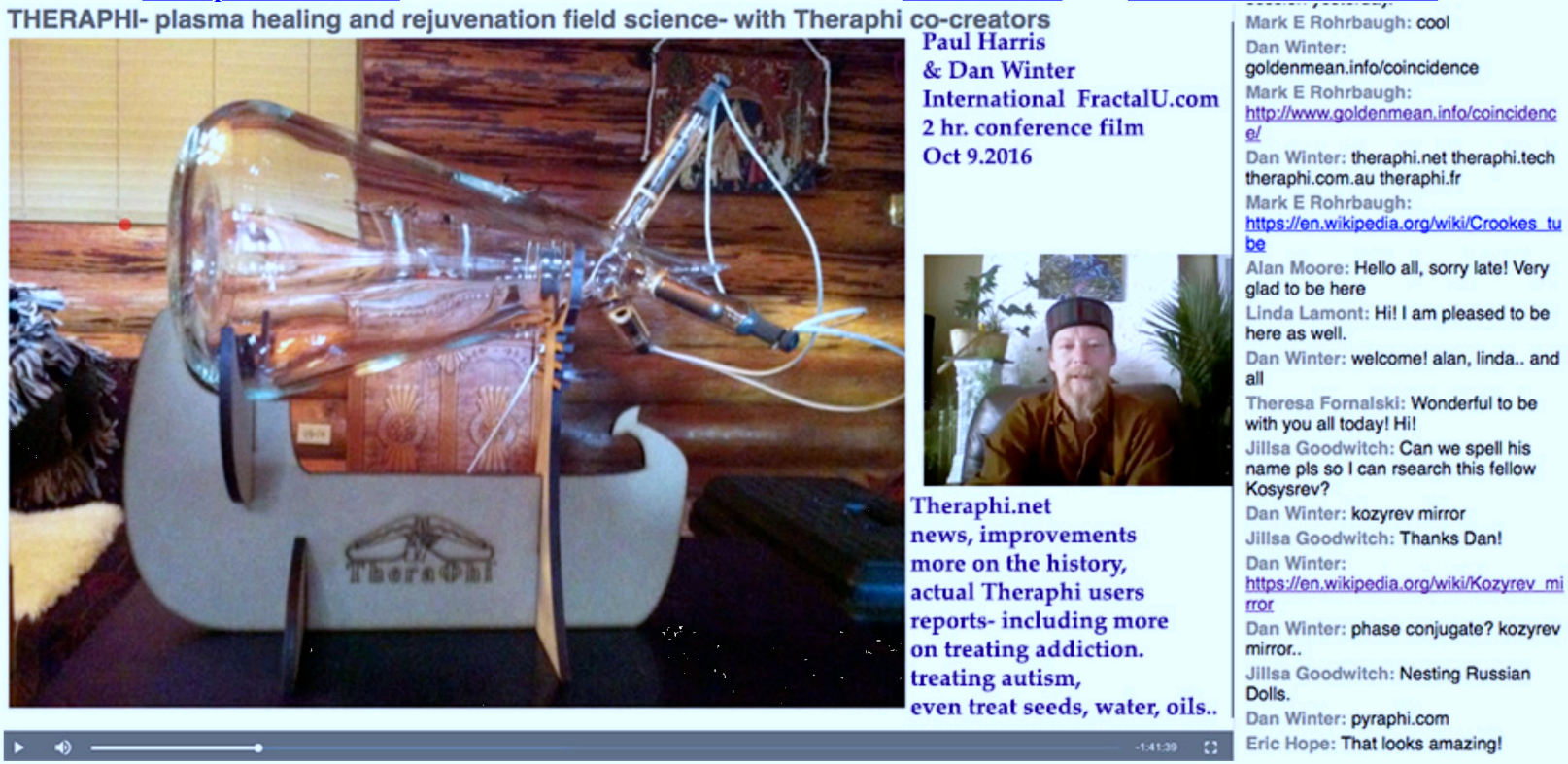
TheraΦhi™
theraphi.net

Theraphi is a powerful double conjugate acoustic modulated bioactive luminous plasma

The actual plasma tube arrangement used for this 'time reverse/rejuvenation' conjugation is depicted with remarkable accuracy in the Egyptian stone carving, It is phase conjugate, centripetal, negentropic.

This kind of strong charge field is by definition simply the electrical opposite of swelling, cyst and tumor growth. It IS this charge distribution efficiency perfected by definition- which is the electrical opposite of cancer. Theraphi – usually generates strong feelings of being energized, metabolic acceleration, circulation and sensation increase. In a large number of cases there is also a feeling of bliss/ euphoria introduced. About 1/3 of users also report - sharpening of vision.

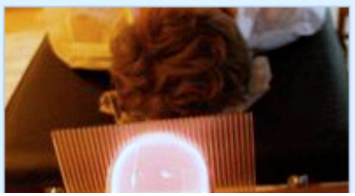
Theraphi- Conference - Paul Harris & Dan Winter International FractalU.com 2 hr. conference film Oct 9.2016



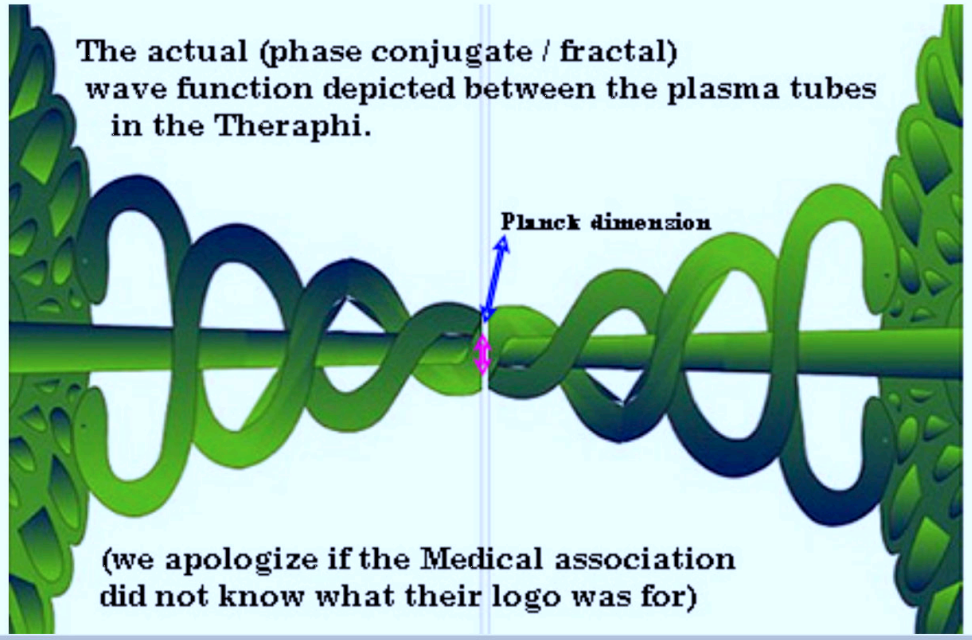
Youtube version (no chat window): https://youtu.be/GWieFtHRtqY - Implosiongroup.com /Dan Winter channel: YouTube.com/c/DanWinterFractalField

Download THERAPHI Conference Graphic Presentation Image Sets - 1. Pauls- Presentation Image set: AETheraphiFractalU.pdf
2. Dan's Presentation- PDF: TheraPhiPresentation.pdf

Oct 9 - 2PM EST -
THERAPHI- plasma healing and rejuvenation field science- with Theraphi co-creators Paul Harris and Dan Winter. We discuss the global impact and amazing early success of their PRIORE based plasma healing system (theraphi.net , theraphi.tech , theraphi.com.au , theraphi.fr). We include practical discussion about applying phase conjugate plasma science to real healing situations- questions and discussion. We also invite several key Theraphi center leaders and practitioners from around the world- should be a most stimulating session.



THERAPHI.NET - PERFECTING THE FAMOUS PRIORE HEALING SOLUTION-
USES OPPOSING/CONJUGATING PLASMA FOR IMPLOSIVE BIOACTIVE REJUVENATION FIELD.


The actual (phase conjugate / fractal)
wave function depicted between the plasma tubes
in the Theraphi.
Planck dimension
(we apologize if the Medical association
did not know what their logo was for)

from Dan Winter www.goldenmean.info The cause of gravity, color, perception,
and Life Force:

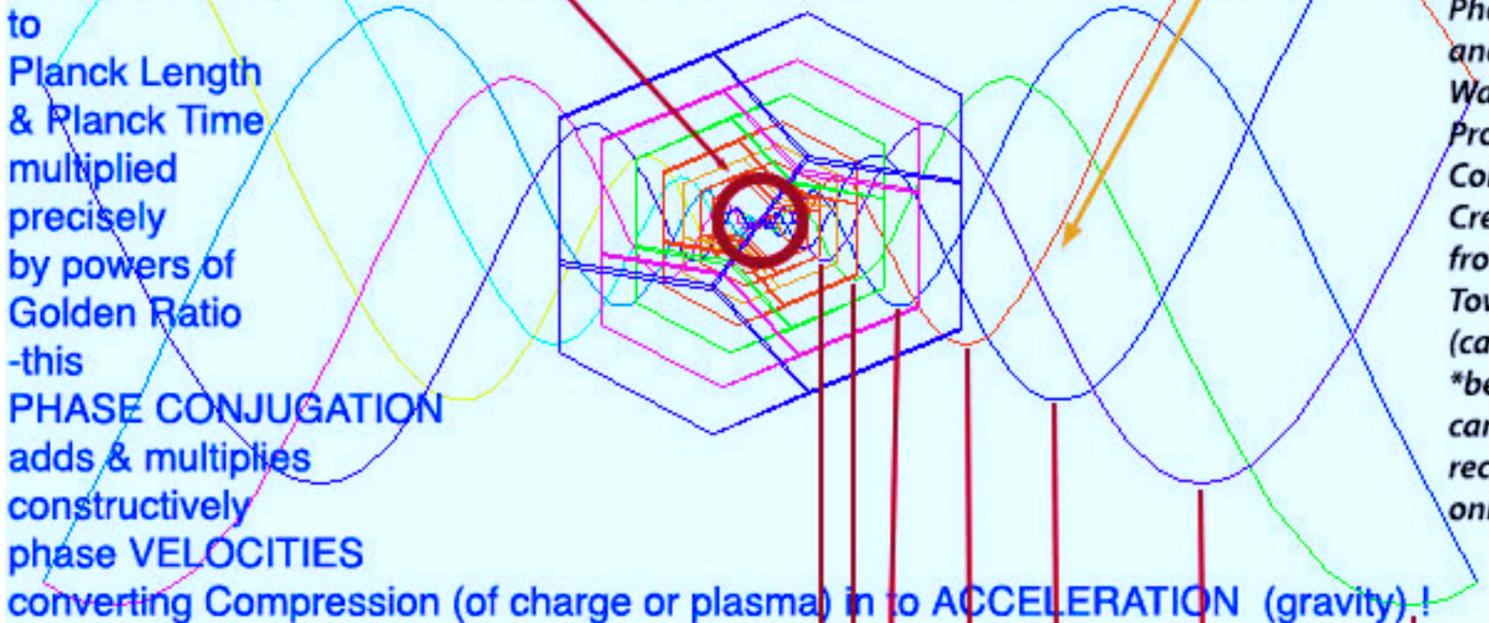
The Centripetal Charge Compression originates: scaled precisely to Planck Length & Planck Time multiplied precisely by powers of Golden Ratio -this PHASE CONJUGATION adds & multiplies constructively phase VELOCITIES converting Compression (of charge or plasma) in to ACCELERATION (gravity) !

Planck Length & Time Universal Musical Key Signature of the Fractal Quantum Foam

The Caduceus IS phase conjugation

Fractal Space Time Essential Wave Mechanics producing all negentropic forces:

Golden Ratio Caducceus Phase Conjugation and Self Similarity Wave Mechanics Produce Constructive Compression- Creating Acceleration from Compression Toward Center (called 'gravity)*because phase velocities can heterodyne recursively constructively only in golden ratio*



Winter's new equations have proven:

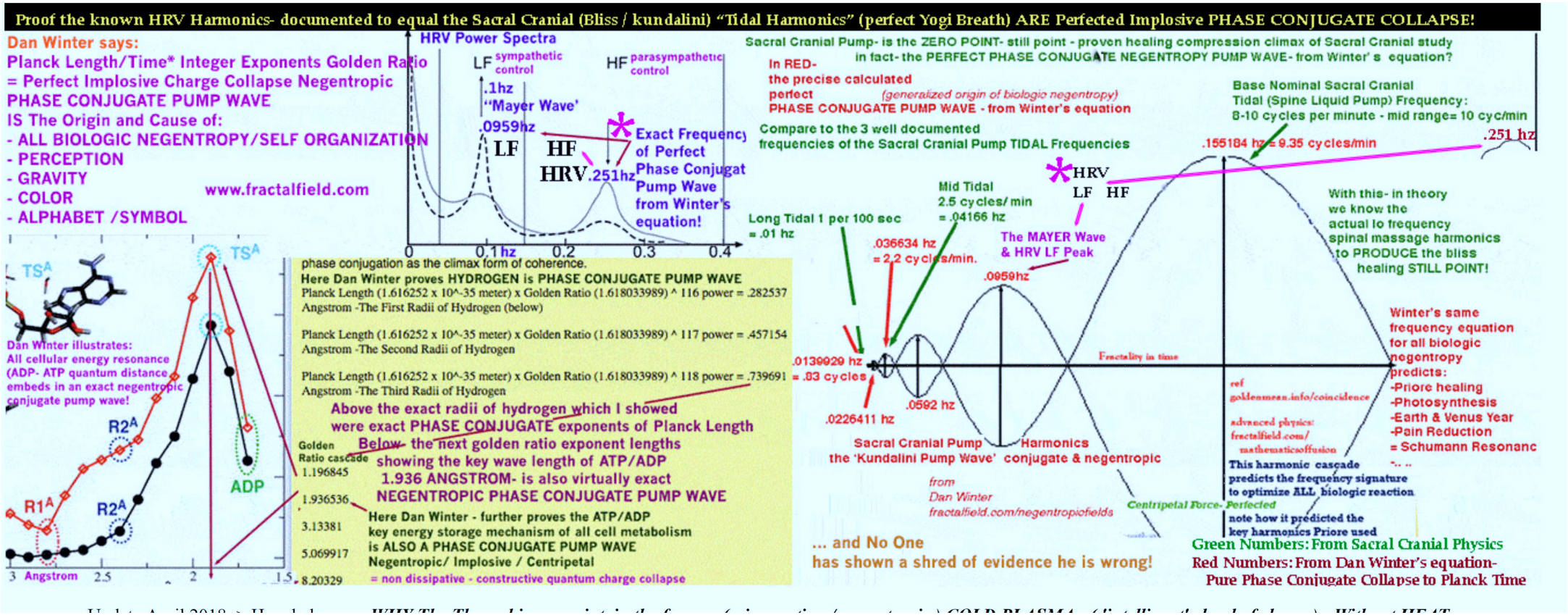
Winter's Equation -hz: (vs)	2.78,	4.5,	7.29,	11.8 ,	19.08,	30.88	49.97,	80.85 hz
Frequencies PRIORE used:	3			10		32		80

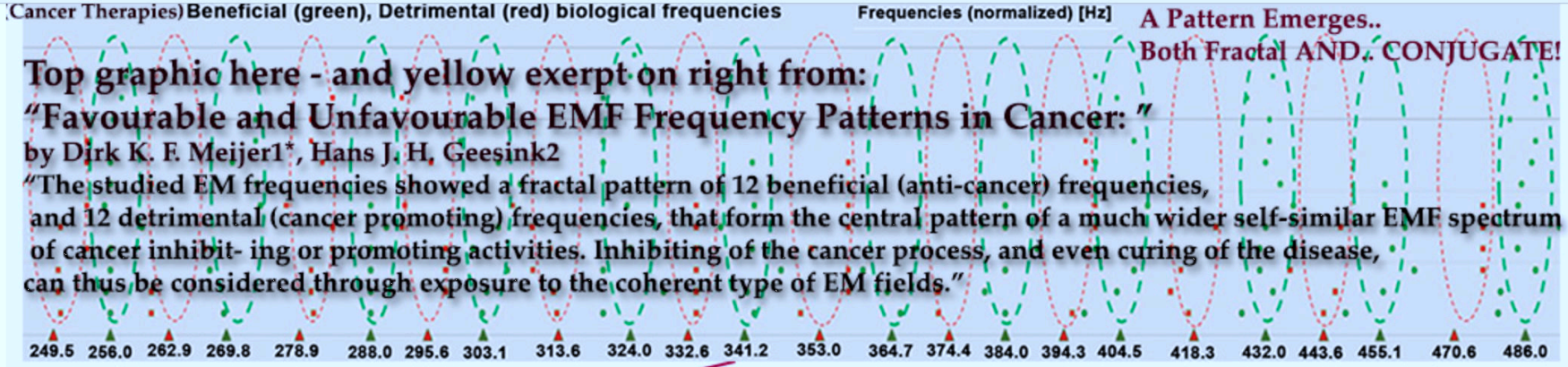
Equation for the ORIGIN OF BIOLOGIC NEGENTROPY (from cover of Dan Winter's book)

Planck Length/Time x Integer Exponents Golden Ratio= Phase Conjugation & Negentropy Perfected!

These virtually exact even Golden Ratio FRACTAL Phase Conjugate Multiples of Planck Length and TIme predict compelling examples of NEGENTROPIC / SELF ORGANIZING and CENTRIPETAL FORCES - like: *Cellular ATP Freq

* Hydrogen Radii, * the ONLY 2 effective Photosynthesis Frequencies, * Schumann Resonance Frequencies *HRV LF&HF Frequenc
* Brainwave Frequencies of Peak Perception / Bliss, * Sacral Cranial Tidal Frequencies , * Ear Ringing Heard by Meditators
* Virtually Exactly the Duration of Earth Year and Venus Year.. (& the Priore and also Rauscher frequencies of bioactive fields!)
and the essential dodeca stellation 3D fractal symmetry of Alchemic collapse / fusion / transmutation,
DNA / living proteins as pent, Earth magnetic grid, Solar system orbital mechanics, and symmetry of masses in the universe!


Proof the known HRV Harmonics- documented to equal the Sacral Cranial (Bliss / kundalini) "Tidal Harmonics" (perfect Yogi Breath) ARE Perfected Implosive PHASE CONJUGATE COLLAPSE!
Dan Winter says:
Planck Length/Time* Integer Exponents Golden Ratio
= Perfect Implosive Charge Collapse Negentropic
PHASE CONJUGATE PUMP WAVE
IS The Origin and Cause of:
- ALL BIOLOGIC NEGENTROPY/SELF ORGANIZATION
- PERCEPTION
- GRAVITY
- COLOR
- ALPHABET /SYMBOL
www.fractalfield.com
HRV Power Spectra
LF sympathetic control
HF parasympathetic control
.1hz
"Mayer Wave'
.0959hz
LF
HF
HRV .251hz
Exact Frequency of Perfect Phase Conjugat Pump Wave from Winter's equation!
0
0.1 hz
0.2
0.3
0.4
Sacral Cranial Pump- is the ZERO POINT- still point - proven healing compression climax of Sacral Cranial study
in fact- the PERFECT PHASE CONJUGATE NEGENTROPY PUMP WAVE- from Winter' s equation?
In RED-
the precise calculated
perfect
PHASE CONJUGATE PUMP WAVE - from Winter's equation
(generalized origin of biologic negentropy)
Compare to the 3 well documented
frequencies of the Sacral Cranial Pump TIDAL Frequencies
Base Nominal Sacral Cranial
Tidal (Spine Liquid Pump) Frequency:
8-10 cycles per minute - mid range= 10 cyc/min
.155184 hz = 9.35 cycles/min
.251 hz
HRV
LF HF
Mid Tidal
2.5 cycles/ min
= .04166 hz
Long Tidal 1 per 100 sec
= .01 hz
.036634 hz
= 2.2 cycles/min.
The MAYER Wave
& HRV LF Peak
.0959hz
With this- in theory
we know the
actual lo frequency
spinal massage harmonics
to PRODUCE the bliss
healing STILL POINT!
Winter's same
frequency equation
for all biologic
negentropy
predicts:
-Priore healing
-Photosynthesis
-Earth & Venus Year
-Pain Reduction
= Schumann Resonanc
-.. ..
.0139929 hz
= .03 cycles
.0226411 hz
.0592 hz
Fractality in time
ref
goldenmean.info/coincidence
advanced physics:
fractalfield.com/
mathematicsoffusion
This harmonic cascade
predicts the frequency signature
to optimize ALL biologic reaction
Centripetal Force- Perfected
note how it predicted the
key harmonics Priore used
Sacral Cranial Pump Harmonics
the 'Kundalini Pump Wave' conjugate & negentropic
from
Dan Winter
fractalfield.com/negentropicfields
... and No One
has shown a shred of evidence he is wrong!
Green Numbers: From Sacral Cranial Physics
Red Numbers: From Dan Winter's equation-
Pure Phase Conjugate Collapse to Planck Time
TSA
TSA
Dan Winter illustrates:
All cellular energy resonance
(ADP- ATP quantum distance
embeds in an exact negentropic
conjugate pump wave!
R2A
R1A
R2A
ADP
3 Angstrom
2.5
2
1.5
phase conjugation as the climax form of coherence.
Here Dan Winter proves HYDROGEN is PHASE CONJUGATE PUMP WAVE
Planck Length (1.616252 x 10^-35 meter) x Golden Ratio (1.618033989) ^ 116 power = .282537
Angstrom -The First Radii of Hydrogen (below)
Planck Length (1.616252 x 10^-35 meter) x Golden Ratio (1.618033989) ^ 117 power = .457154
Angstrom -The Second Radii of Hydrogen
Planck Length (1.616252 x 10^-35 meter) x Golden Ratio (1.618033989) ^ 118 power = .739691
Angstrom -The Third Radii of Hydrogen
Above the exact radii of hydrogen which I showed
were exact PHASE CONJUGATE exponents of Planck Length
Below- the next golden ratio exponent lengths
showing the key wave length of ATP/ADP
1.936 ANGSTROM- is also virtually exact
NEGENTROPIC PHASE CONJUGATE PUMP WAVE
Here Dan Winter - further proves the ATP/ADP
key energy storage mechanism of all cell metabolism
is ALSO A PHASE CONJUGATE PUMP WAVE
Negentropic/ Implosive / Centripetal
= non dissipative - constructive quantum charge collapse
Golden Ratio cascade
1.196845
1.936536
3.13381
5.069917
8.20329



A Pattern Emerges..
Both Fractal AND.. CONJUGATE!

Top graphic here - and yellow exerpt on right from:
"Favourable and Unfavourable EMF Frequency Patterns in Cancer: "

by Dirk K. F. Meijer1*, Hans J. H. Geesink2

"The studied EM frequencies showed a fractal pattern of 12 beneficial (anti-cancer) frequencies, and 12 detrimental (cancer promoting) frequencies, that form the central pattern of a much wider self-similar EMF spectrum of cancer inhibit- ing or promoting activities. Inhibiting of the cancer process, and even curing of the disease, can thus be considered through exposure to the coherent type of EM fields."

Right>
Frequencies hz
Predicted
Conjugate/
Negentropic
by Dan Winter
equation
Planck Time*Phi^N

as used
approximately by
Lakhovsky/
Priore
and now precisely
in THERAPHI.net
now commercially
successful in
20 countries

554.1627785
342.4914324
211.671346
130.8200863
80.85125972
49.96882653
30.88243317
19.08639335
11.79603981
7.290353535
4.505686274
2.784667259
1.721019013
1.063648245
0.657370768
0.406277478
0.25109329

Comparison from
Dan Winter
Theraphi.net/static
Article referenced is probably
the most thorough study of cancer
treatment frequencies.

1) Extremely low 50 Hz EMF field frequencies are located in a coherent frequency-zone that are able to inhibit and retard cancer
Many studies show that a 50 Hz electromagnetic wave at a nearly pure, transient-free 50 Hz, is able to retard tumor and inhibit tumor formation (Hisamitsu, 1997; Wertheimer, 1979; Simkó, 1998; Pang, 2001; Tofani, 2002, 2003; Traitcheva, 2003; Morabito, 2010; Berg, 2010; Filipovic, 2014) or by using a 50 Hz wave with a typical modulation:
- Nucleosome-sized DNA fragmentation (a biochemical marker of apoptosis) was induced in human myelogenous leukemic cell lines, HL-60 and ML-1, when exposed to 50 Hz electromagnetic fields. This 50 Hz wave did not induce detectable DNA fragmentation in either human peripheral blood leukocytes or polymorphonuclear cells (Hisamitsu, 1997).
- Human colon adenocarcinoma and human breast adenocarcinoma exposed to 3 mT static MF, modulated in amplitude with 3 mT ELF-MF at 50 Hz, showed morphological evidence of increased apoptosis (Tofani 2002).
- Anticancer activity of electromagnetic fields was observed by exposing mice bearing a subcutaneous human breast tumour to modulated MF extremely low frequency fields at 50 Hz at an intensity of 5.5 mT (Tofani 2003).
- Increased apoptosis in human breast cancer cell lines occurred by exposure during 24 and 72 h to pulsed EMF (50 Hz; 10 mT) compared with untreated control cancer cell lines (Filipovic, 2014).

- Pulsed EMF at 20 Hz and intensity of 3 mT during 3 days showed cytotoxic to breast cancer cells (Crocetti, 2013).

- Electromagnetic exposure by 0.4 T, 7.5 Hz for 43 days inhibited the growth and metastasis of melanoma cancer cells and improved immune function of tumor-bearing mice (Nie Y., 2013).
- Microarray of human A549 lung adenocarcinoma cells exposed for 1 hour to 8 Hz electromagnetic wave showed a duration-dependent inhibitory effect and the cell cycle and apoptosis-related genes had 2-fold upregulation and 40 genes had 2-fold downregulation (Feng, 2013).

- Exposure of mice injected with mouse breast cancer cells to electromagnetic fields, for 6 h. daily at 100 mT, 1-Hz, half-sine-wave unipolar magnetic fields for as long as 4 wk, suppressed tumor growth (Tatarov, 2011).

- Pulsed electric fields of of 0.5 Hz and greater than 20 kV/cm, with rise times of 30 ns and durations of 300 ns (3.32 MHz) penetrate into the interior of tumor cells and cause tumor cell nuclei to rapidly shrink and tumor blood flow to stop. Melanomas shrink by 90% within two weeks. A second treatment at this time can result in complete remission (2006).

Theraphi.Net

Theraphi Group Contact:

info@Theraphi.net

Email for info - if you would like to visit one of our Theraphi demonstration sites / healing centers:

Completed:

-Begium

- S.France- Perpignan

Available late Jan.:

- Georgia, USA

Available late Feb:

- Australia, NSW

- Canada, Calgary

Available March>

- New York USA, Manhatten

- Barcelona, Spain

Available April:

London,

Available June:

Bosnian Pyramids

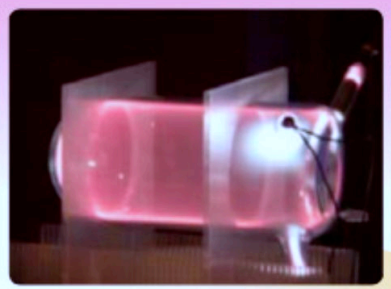
PLASMA HEALTH
The Revolutionary "Theraphi Device"

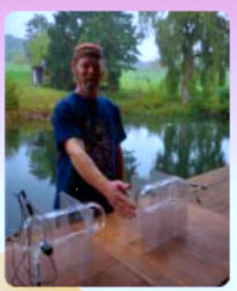
New York City Theraphi Installation & Demo Event Mar.25-27 2016

Roger Green

A POWERFUL PHASE CONJUGATOR

info@Breakthu-Technologies.com





THE INSPIRATION FOR creating the Theraphi is over 100 years of pioneering efforts by Nikola Tesla, Georges Lakhovsky, Royal Raymond Rife, and especially Antoine Prioré.

The Theraphi produces a beautiful plasma light and powerful bio-active field. Precise electromagnetic frequencies derived from hydrogen and phi-ratio harmonics are modulated and pass through a unique mixture of noble gases. The resulting super coherent plasma wave field restores order to the body's cellular regenerative system by reversing the entropy of the disease process.

The Theraphi technology has a huge potential for pain reduction, longevity, enhancing the immune system and reducing healing times. It restores biological coherence thereby increasing homeostasis. It is well known for increasing circulation, and aiding in various aliments.

Theraphi is intended for experimental use in the study of general vitality.

APPLICATIONS

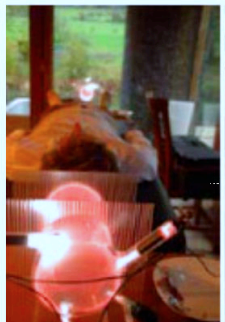
- Natural Pain reduction
- Reducing inflammation
- Tissue regeneration
- Enhancing cancer remission (well documented by Priore)
- Anti-aging

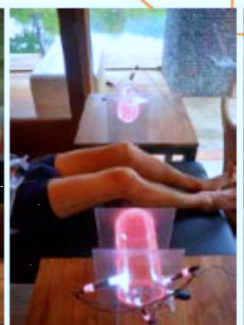
Negentropy and Cell Memory Reversal

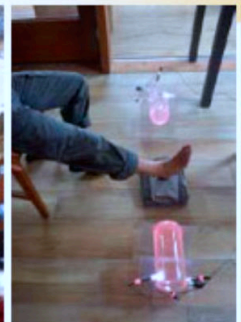
Negentropy is the reverse of entropy. It is the tendency to increase order leading to a steady predictable state. Life is considered to be negentropic because it consumes energy like food and transmutes it into the more ordered requirements for cellular function. This effect on the cells and tissues of the body is one of the scientific definitions we have for Healing and Anti-Aging.

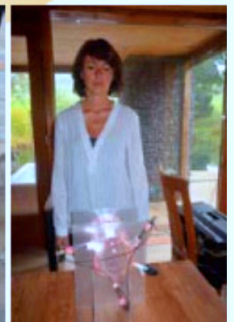
The actual 'healing' system in the body is the cellular regenerative system. Biological systems use longitudinal EM waves. **The Theraphi System** tailors these specific waveforms generating a rich information field. It restores the cell's memory of being 'healthy' - the process of **Cell Memory Reversal**.

The Theraphi technology has the potential to have a huge influence on pain reduction, longevity, enhancing immune systems and reducing healing times









www.PlasmaHealth.info Contact Roger Green info@Breakthru-Technologies.com

MARCH 2016

Is this the worlds most advanced technology for a healing effect?

Welcome to the THERAPHI Device

A phase conjugator that produces a plasma regenerative, negentropic, bio-active healing field!

This unique invention brings together **Dan Winter's new frequency recipe for Hydrogen and Planck length** (based on the golden mean ratio / phi) with Schumann and sacral cranial resonance frequencies.

This new mathematical theory, an original discovery by Dan Winter, gives us the breakthrough for our advanced technology. These are the essential (dodeca stellation) Golden Ratio fractal symmetry of implosion negentropy (life giving) centripetal bio-active fields.

Theraphi is a one of a kind and a new approach, never before has broadcast bioactive field plasma been so broad-spectral and never before have conjugate PAIRS of field generators been used, including noble gas optical conjugation.

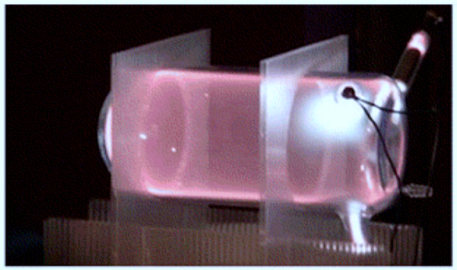
Precise frequencies of atomic hydrogen and modulation by the golden mean (phi) ratio allows for the addition and multiplication of waves of charge and energy. These centripetal negentropy (life giving) waveforms are the only type of electromagnetism that effects the body's cellular regenerative system, which is well documented in the scientific literature has been proven to have medical applications.

Canadian inventor Paul Harris engineered the Theraphi which uses a non destructive single carrier wave to modulate our complex waveforms, creating multiple RF induced fields mixed in an ion plasma tube, referred to as 'The Conjugator'. Various noble gases and frequency cascades were tested until the perfect mix was achieved.

The Theraphi system uses longitudinal EM waves and time-polarized EM waves that penetrate every cell and atomic nucleus in the body. The fact that such signals can effect and possibly reverse cellular illness of the body has been proven by Priore and is in the French scientific literature. The electrodynamics that results from this technology are part of the emerging "Fractal Unified Field Theory".

PAUL HARRIS IN NEW YORK CITY MARCH 2016

Click here: Roger Green's Theraphi Newsletter about the New York and Prague Theraphi Events- includes a helpful summary of further (still anecdotal) results reports.



Bio Active fields are referred to as a wave function that uses certain geometries (fractal, phase conjugate with golden ratio) and can self organize and become intelligent and 'alive'. Phase conjugation produces longitudinal wave acceleration (some call this gravity and life producing). Once we agree that the universe is made only of waves of 'charge', the illusion that there is such a thing as a particle has clearly been a distraction. When these waves of charge enter rotation in a slip knot or torus they store inertia, momentum, energy and compression (welcome to the material world).

The Fractal Field Unified Theory and the principle of the Golden Mean allow for the addition and multiplication of waves of charge and energy. The idea of symmetry is vital to both. Quantum physicists can explain the menagerie of fundamental particles we observe – quarks, gluons, fermions, bosons and more – as different facets of a symmetrical object. Relativity, too, is an expression of the symmetries that exist between space and time (Einstein's famous equation E=mc2 articulates a symmetry between mass and energy). Symmetry is part of the language of nature, from the molecular level on up.

Dan Winter's work was to prove the wave equations showing golden ratio solves the problem of maximum constructive interference, compression, and phase conjugation. The precise wave geometry of non-destructive collapse and restored centripetal forces uses the golden mean ratio, which is incorporated into the waveforms used by the Theraphy Healing device.

The Bio Active Field and Negentropy: The Life Organizing Principle

From the writer of the famous book "What is Life" by Erwin Schrödinger, he defines Negentropy as "living organization, space-time structure, stored energy, coherence, coupled cycles and thermodynamics of organized complexity, the remarkable ability of the living system to increase organization".

Negentropy and self organization is well documented in phase conjugate optics. Symmetric coherent wave fields converge in such a way that their focal point becomes centripetal and self organizing to create an increase in net order. Negentropy is reverse entropy. It means things becoming more in order, it is the force that seeks to achieve effective organizational behavior and lead to a steady predictable state. Life is considered to be negentropic because it takes things in less order, like food, and turns it into things in more order, like cells in the body, tissues, and organs. Negentropy affects our view of time, because time in science is defined as the direction of entropy. Negentropy is referred to as reverse entropy, hence "reverse time" , a process where the cell can remember what it was originally like before disorder set in (a definition of healing). Negentropy is a process of "reverse time" which takes something back to its earlier state. It is what happens inside a pyramid when it is re-sharpening a razor blade, the centripetal forces applied gather the molecules back into 'phase' and order. The same coherent forces in the Theraphi restore your body to your original condition, which is called rejuvenation and healing.

Cell Memory Reversal

The actual "healing" system in the body is the cellular regenerative system. All living things are made up of cells. The cell is the smallest living thing that can do all the things needed for life. All cells must come from pre-existing cells, and have continuous repair and maintenance of their own existence. This is an electromagnetic system, but of a rare kind not used in our common power systems, communication systems, etc. Instead of using the common transverse EM waves, this system uses longitudinal EM waves and time-polarized EM waves. A time-polarized EM wave is an energy current in the time domain, as in the quantum field theory. There we are introduced to time-polarized photons a "compression and rarefaction of the local rate of flow of time", according to Thomas Bearden. Biological systems use common electromagnetism, frequency modulation, amplitude modulation, and also used this "time-domain" type of "hidden" electrodynamics. In fact, it uses it to heal damaged cells, etc. When these strange kind of electromagnetic wave that would suddenly appear in experiments (1972) and "restore order", modern phase conjugate optics was born.

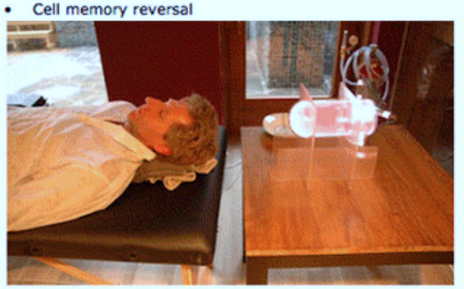
The efficacy of electromagnetic wave therapy has been well documented for over 60 years. History tells us through countless experiments and case histories that the right mixture of signature frequencies can effect the human body's responses to viruses, parasites, immune deficiencies, increases in metabolism, heart rate variability, reduction of inflammation, treatment of degenerative diseases and natural pain relief.

We are electrical magnetic beings. Every cell in your body has a certain voltage and frequency that it optimally manifests. Our organs are composed of cells formed of protoplasm containing various mineral matters and acids, such as iron, chloride, phosphorous, etc. It is by the combination of these elements that the cells detect outside waves and vibrate continuously at a very high frequency. The amplitude of cell oscillations must reach a certain value, in order that the organism be strong enough to repulse the destructive vibrations from certain microbes. Cell metabolism consists of wavelengths that originate from long wave inputs such as proteins to very short wave with hi information density UV light which drives cell metabolism and switches on the DNA. The actual "healing" system in the body is the cellular regenerative system. This is an electromagnetic system, but of a rare kind not used in our common power systems, communication systems, etc. Instead of using the common transverse EM waves, this system uses longitudinal EM waves and time-polarized EM waves.

The Theraphi system tailors these specific scalar longitudinal waveforms, producing mitogenic radiation, primarily in the UV region of the spectrum but also involving other frequencies. It directly affects the cells nucleus with phase conjugate (time reversed) waves, which restores the cells atomic memory (of being healthy) - the process of Cell Memory Reversal.

This technology has a huge potential for pain reduction, longevity, enhancing immune systems and reducing healing times. It restores biological coherence thereby increasing homeostasis in cellular systems. It is well known for increasing circulation and the treatment of certain degenerative diseases and aiding in various aliments.

- Natural Pain reduction
- Reducing inflammation
- Tissue regeneration
- Enhancing cancer remission
- Anti-aging
- Cell memory reversal



Testimonials

- A woman with a Lupus rash (vasculitis blisters) had complete healing in three days.
- AN acute back injury requiring a wheelchair to come and the pain resolved with a 3-minute treatment, and that man walked out, standing straight, with NO PAIN.
- Resolution of peripheral vision limitations and night blindness in another
- A woman who has had a series of strokes that left her with residual left sided weakness has immediate improvement in strength, and mental function (specifically word processing).
- Chronic prostate (BPH) problems improved by 50%, insomnia gone, morning stiffness resolved completely.
- Post concussive problems and vertebral fracture pain dramatically improved.
- This is an amazing opportunity to utilize a device which is experimental at this time, and which is based on the PRIORE device which actually cured cancers. We can only hope that this is true for this device...

Theraphi effect for James from Minnesota: Three sessions 3 minutes each.....came in with massive lymphatic carcinoma on right side of cheek and jaw. After 24 hours was reduced 50 percent in size. James has Beta Cell Lymphoma, and when he arrived he looked like the Elephant Man on the right side of his face. Three days later he looked almost normal on that side (from Jan)

TheraΦhi

Operation Information Manual V1.6

www.theraphi.net

Introduction:

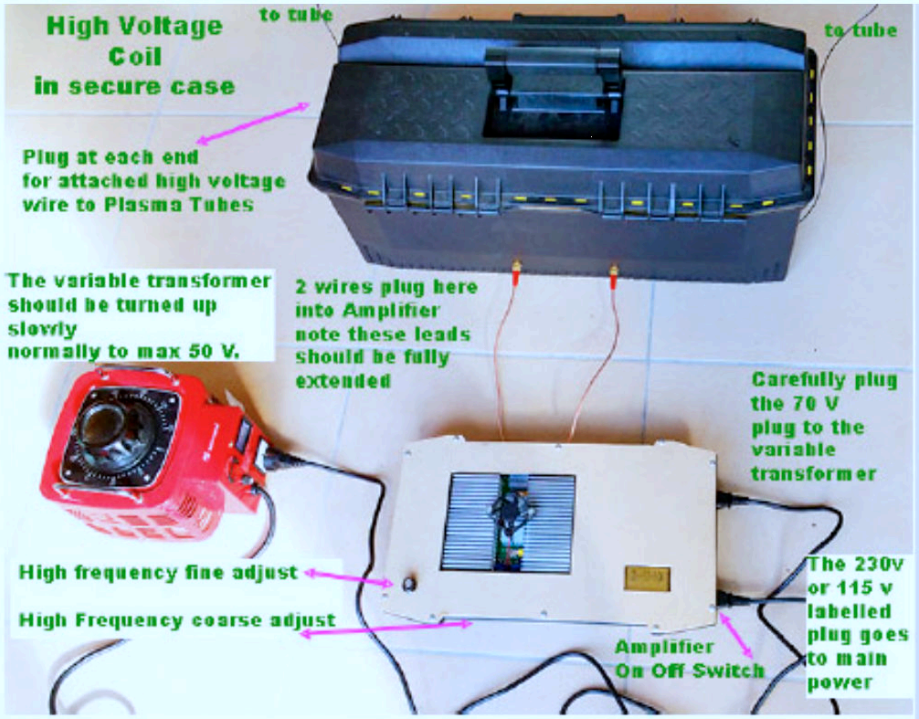
The Theraphi is an electronic device for creating a radiative bio-active plasma field by using radio frequencies as a carrier wave for various frequency signatures. The inspiration for the creation of this device is based on the pioneering efforts of Nicola Tesla, Georges Lakhovsky , Royal Raymond Rife and especially Antoine Prioré in France .

The Theraphi takes their work to a whole new level, utilizing modern solid state electronics and Dan Winter's new equation and 'phase conjugate' physics to much more accurately and broad spectrally generate implosive / centripetal / phase conjugate charge fields. Theraphi is a one of a kind, new approach, never before has broadcast bioactive field plasma been so broad-spectral and never before have conjugate PAIRS of field generators been used, this includes noble gas optical conjugation.

The Theraphi is an experimental device at this point and so far we have received some remarkable testimonials from volunteers who have experienced the field effects, some people experience onset of various emotions, increased energy levels are common. Increased circulation, warmth and tingling sensations have been reported. Sacral cranial professionals have suggested the 'sacral cranial' spine liquid pump changes reaching the spine pump 'still point' – normally associated

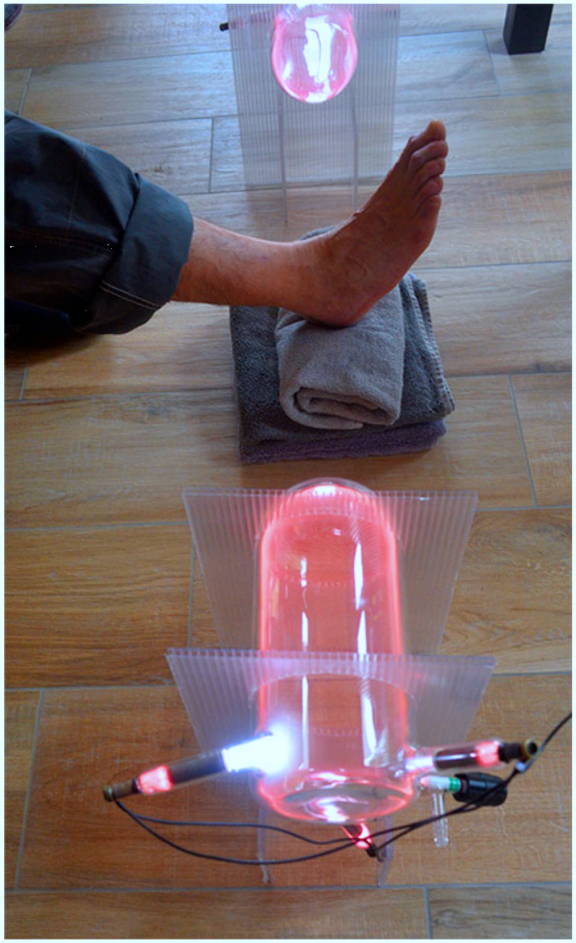
Download new Theraphi Plasma Rejuvenation Operation Information Manual TheraPhi_Operation_Information_Manual_V1-6.pdf

www.TheraPhi.net



Theraphi is constituted of several key components:
a) Variable Transformer for 15 amp- variable AC (50/60) cycle input voltage
b) Main amplifier mixer section containing inputs for either 115 or 230 v 60/50 cycle AC, and additional input labeled 70 V for the connection to the variable transformer. Note the amplifier picture here shows the location of the tuning adjust (both fine and coarse), the on/off switch, etc.

c) High voltage "Tesla Resonator Coil" in large protective case. Note in the photo, the connections on each opposite END of the coil case go to the plasma



During the trials in Belgium- above- our client was clear- significant restoration of feeling in his hand (which had been numb)- similar results for foot treatment- many other positive results - including one- who was barely able to walk- with foot injuries - and a metal implant in his foot- who regained major use of his foor- and walkability- within minutes.
Note these and many similar reports are most encouraaging - but anecdotal- we await more diligent recordings of clinical results from professionals.

In the film- Paul describes how Priore took much of his inspiration from LAKHOVSKY- for the powerful frequency recipe which later emerged in Dan Winter's equation for the Theraphi- frequency recipe.-

Note (picture here) here- how Lakhovsky- had 'tripped over' golden ratio in his charge spark gaps- and harmonics- (frequencies he got from Tesla and Rife) -unaware how key this was to his charge field device:

Golden Ratio MWO Antenna

- ***Produces spread of Tesla Coil Frequencies. Every cell in your body exposed to its Natural Resonant Vibratory Rate.***
- ***Experimental subjects sits or lays between pair of antennas; and then actually becomes part of the Tesla Coil circuit through "Capacitive Loading".***
- ***BENEFIT: Detoxification effect and Rejuvenation Effect as cells attempt to return to natual vibratory rates: Much like tuning fork brought near a piano string.***

Lakhovsky evidently did not understand:

- how to scale his golden ratio phase conjugation precisely to Planck (length/time)

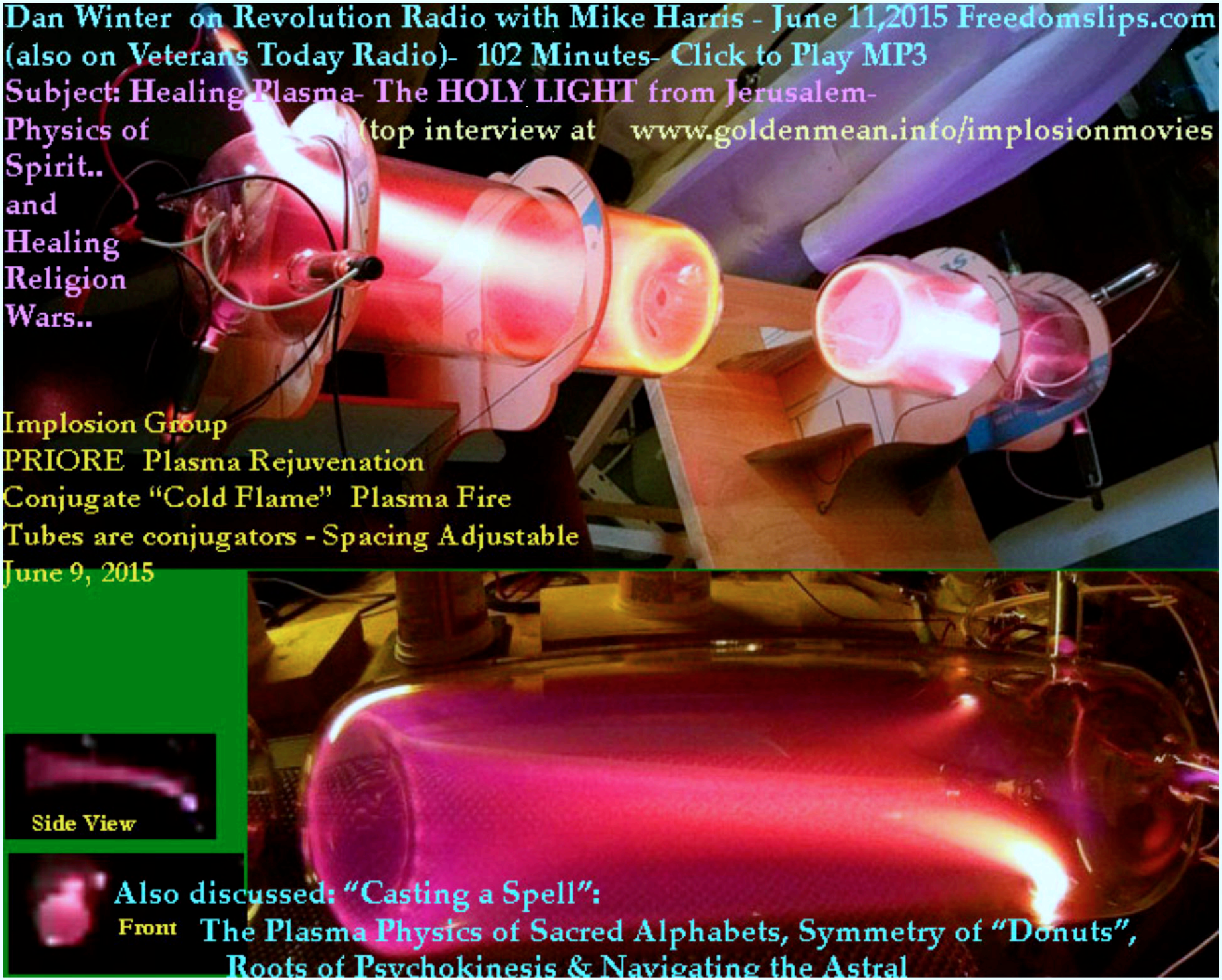
-how golden ratio creates phase conjugation

-how phase conjugation requires opposing golden ratio pairs FROM OPPOSITE SIDES - to accurately conjugate

-how to make the phase conjugation broad spectral - and thus much more powerful - by cascading this all the way to optical / and conjugate noble gasses.

The Theraphi takes the Lakhovsky principle- which is related to golden ratio phase conjugation in charge waves, and makes it much more broad spectral- using plasma- and thus orders of magnitude more effective.

Note- a signiicant number of health professionals- using Lakhovsy device professionally- in Europe- attended our launch events with Theraphi- to try it. Their reports- were very consistent- they said - the Theraphi field was in many ways like the Lakhovsy field- BUT MUCH MORE POWERFUL- AND MUCH MUCH FASTER IN EFFECT.


Dan Winter on Revolution Radio with Mike Harris - June 11,2015 Freedomslips.com
(also on Veterans Today Radio)- 102 Minutes- Click to Play MP3
Subject: Healing Plasma- The HOLY LIGHT from Jerusalem-
Physics of
Spirit..
and
Healing
Religion
Wars..
(top interview at www.goldenmean.info/implosionmovies
Implosion Group
PRIORE Plasma Rejuvenation
Conjugate "Cold Flame" Plasma Fire
Tubes are conjugators - Spacing Adjustable
June 9, 2015
Side View
Front
Also discussed: "Casting a Spell":
The Plasma Physics of Sacred Alphabets, Symmetry of "Donuts",
Roots of Psychokinesis & Navigating the Astral

Regenerative Medicine Mechanism: pdf download

Dr Elsheik new paper

A Quantum Information Biology Approach

Regenerative Medicine, Fractal Fields and Priore - LifePrinciple.com (download

Elsheikh M Elsheik

Abstract:

Regenerative medicine, in particular electromagnetic (EM) therapy, has been in trouble during the last half century. Although enormous experimental evidence is gathered to support the claim that EM therapy cures certain diseases, e.g., cancer, leukemia, etc., yet there is no convincing mechanism to agree upon. That is because a fundamental natural law, the driving force which underpins the mechanism, escaped human imagination. It is the maximum action principle which states that a biosystem's rate of action increase, as it traverses a path of maximum action, is proportional to its bioinformation. Hence cellular regenerative control system is the sequential ordering and arrangement of DNA nucleotides along a path of maximum action and maximum bioinformation, that is phi spiral. In consequence DNA becomes a vortex for charge implosion and acceleration. DNA bioinformation template, generated by cellular regenerative control system's charges implosion and acceleration, is a cascade or replica of phase conjugate EM waves. When targeting bioinformation disease by its corresponding healthy bioinformation template, the healthy bioinformation template becomes a bioinformation attractor for self rearranging the distorted or missed nucleotides along a path of maximum action. The DNA bioinformation template mechanism accounts for both Antoine Priore's machine enigma and Luc Montagnier's non-particle view of life.

Life Fractal Nature:

Dan Winter - a pioneer on golden ratio in physics- asserts that golden ratio fractality is a condition of recursive constructive interference. In his view DNA golden ratio based dodecahedron fractal geometry is the only geometry that allows wave patterns to add and multiply recursively constructively, thus produces optimum charge distribution and coherence. He coined the term quantum fractal field to designate the state of perfected charge distribution and coherence characteristic of the DNA.[18]

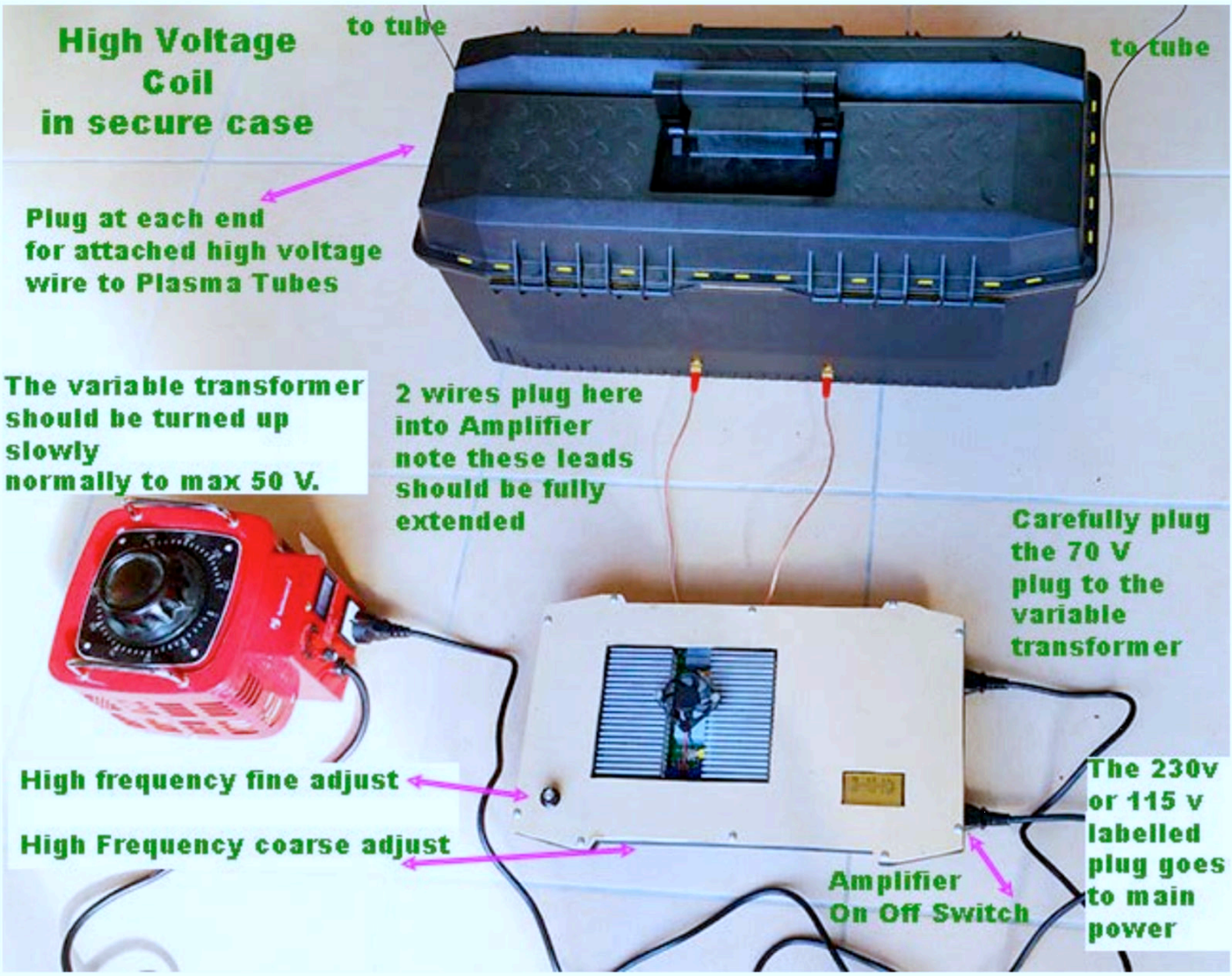
Bioinformation; Bioinformation attractor; Bioinformation diseases; DNA bioinformation template; EM therapy; maximum action principle.

Antoine Priore: Into a tube containing a plasma of mercury and neon gas, a pulsed 9.4 GHz wave modulated upon a 17 MHz carrier frequency was introduced. Complete remission of terminal tumors and infectious diseases in hundreds of laboratory animals of the treated diseases was obtained. "In the mid-70's Priore's work was suppressed, because of hostility of the oncology community, change of the French Government, loss of further funding, and complete inability of the physicists and biological scientists to even hypothesize a mechanism for the curative results."[14]

Searching for a mechanism in order to account for EM therapy, Bearden T assumed that there is a specific, constant electromagnetic "delta" that differentiates the parasitic cancerous "organism" from the normal -human cellular organism.[16] This "delta" can be considered a sort of constant, complex-structured charge existing in the body's atomic nuclei. If a phase conjugate replica of a cancer's cell's specific "delta" frequencies is fed into the body having that cancer, the deviation of the cancer cell's master cellular control system will be "time reversed." The cancerous cell will be immediately destroyed, or reverted back to a normal cell of the animal.[17]

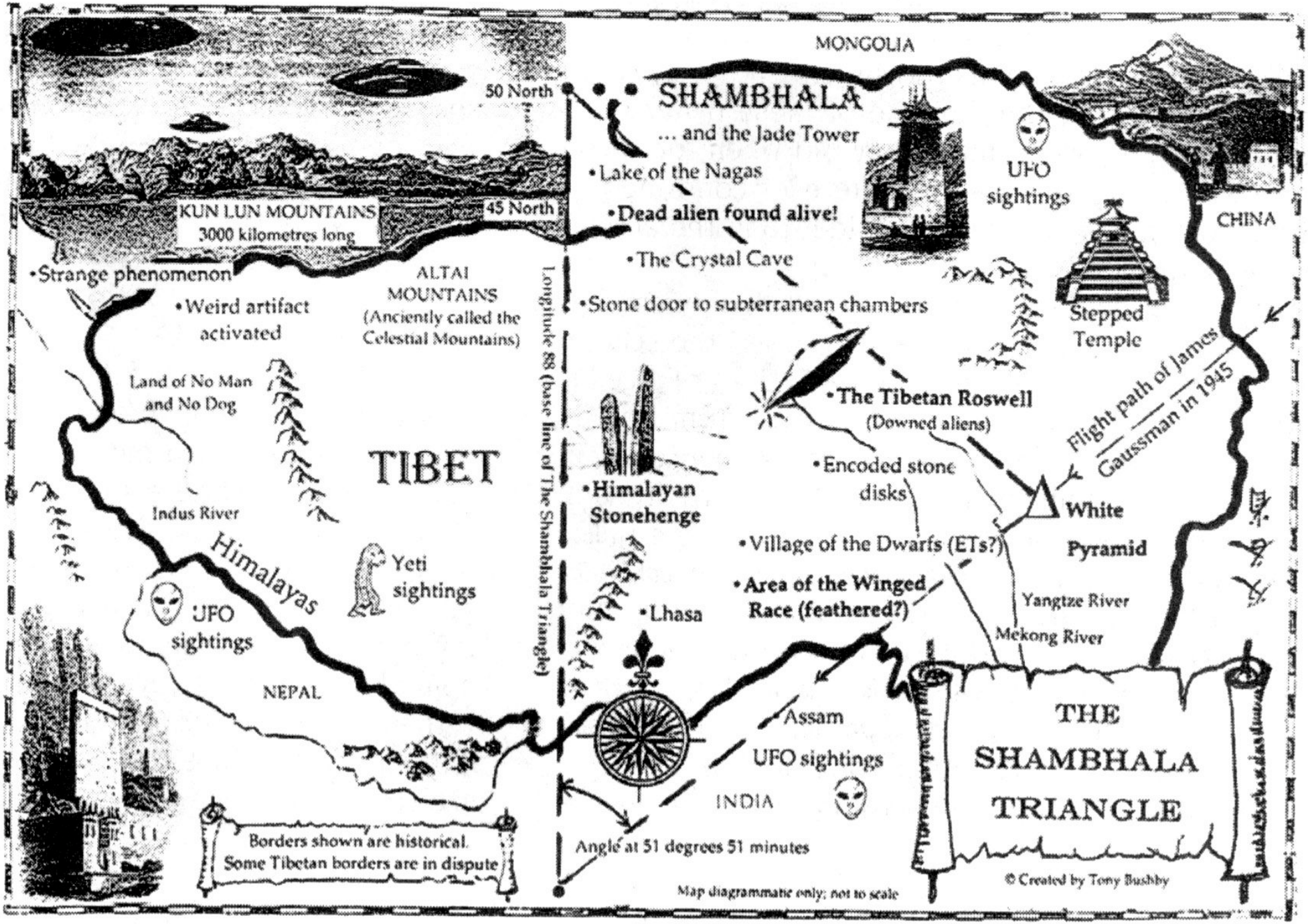
Bearden clarifies two important components concerning regenerative medicine mechanism that are phase conjugation and longitudinal waves.[16] Phase conjugation is important because coherence is necessary for energy waves to be effective. Longitudinal waves have the property of operating along the time domain in conformity with biosystems' fundamental dynamics which takes place along the time domain.[4] However, since the healing frequencies replica based on experimental evidence are not property of a cancerous cell, it becomes urgent to look for an alternative. Bearden proposes (without offering any operational definition) that the cellular regenerative control system, as a source of scalar waves, resides in the atomic nuclei of cells. In this perspective scalar waves, due to its negentropy and time reversal, structure and organize DNA. It is evident for DNA to selforganize and function it has to have energy (e.g.,scalar), but this does not necessarily mean that the negentropy is the cause of selforganization or selfregegeration. For example as an organism grows it takes in negenetropy, however after maturity it goes on taking in negentropy but without further growth and development. In other words what characterizes the dynamical essence of a biosystem is its bioinformation rather than its electric charge. Therefore, the EM waves that can do healing and regeneration must be carrier of bioinformation and not negentropy. Yes, there is a difference between negentropy and bioinformation. While negentropy is passive information a measure of static order or complexity in terms of bytes, bioinformation is active information a measure of developmental functional complexity, and for this sake has the dimensions of energy and information, with units (cal x bytes)[2-3,4].

DNA self-organizing capacity is due to the fact that it possesses the only geometry, its helical and golden ratio based dodecahedron fractal geometry[18] that embodies the



Theraphi is constituted of several key components:
a) Variable Transformer for 15 amp- variable AC (50/60) cycle input voltage
b) Main amplifier mixer section containing inputs for either 115 or 230 v 60/50 cycle AC, and additional input labeled 70 V for the connection to the variable transformer. Note the amplifier picture here shows the location of the tuning adjust (both fine and coarse), the on/off switch, etc.

c) High voltage “Tesla Resonator Coil” in large protective case. Note in the photo, the connections on each opposite END of the coil case go to the plasma



The Shambhala Triangle (© Tony Bushby)

ॐ

virupa god of yoga

VISHNU SHIVA BRAHMA

ELAPHANTA Caves

Ajanta, Ellora and Elephanta

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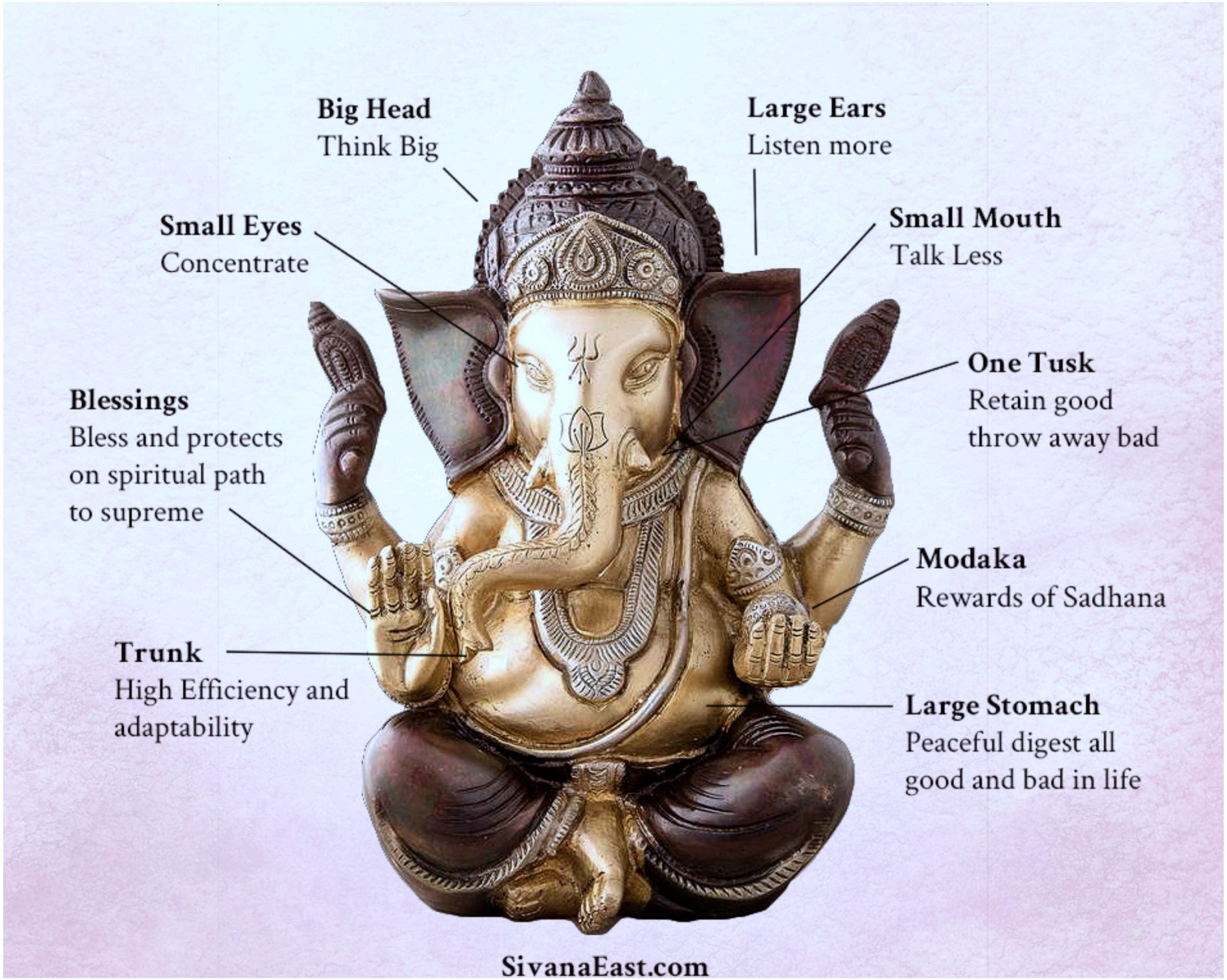
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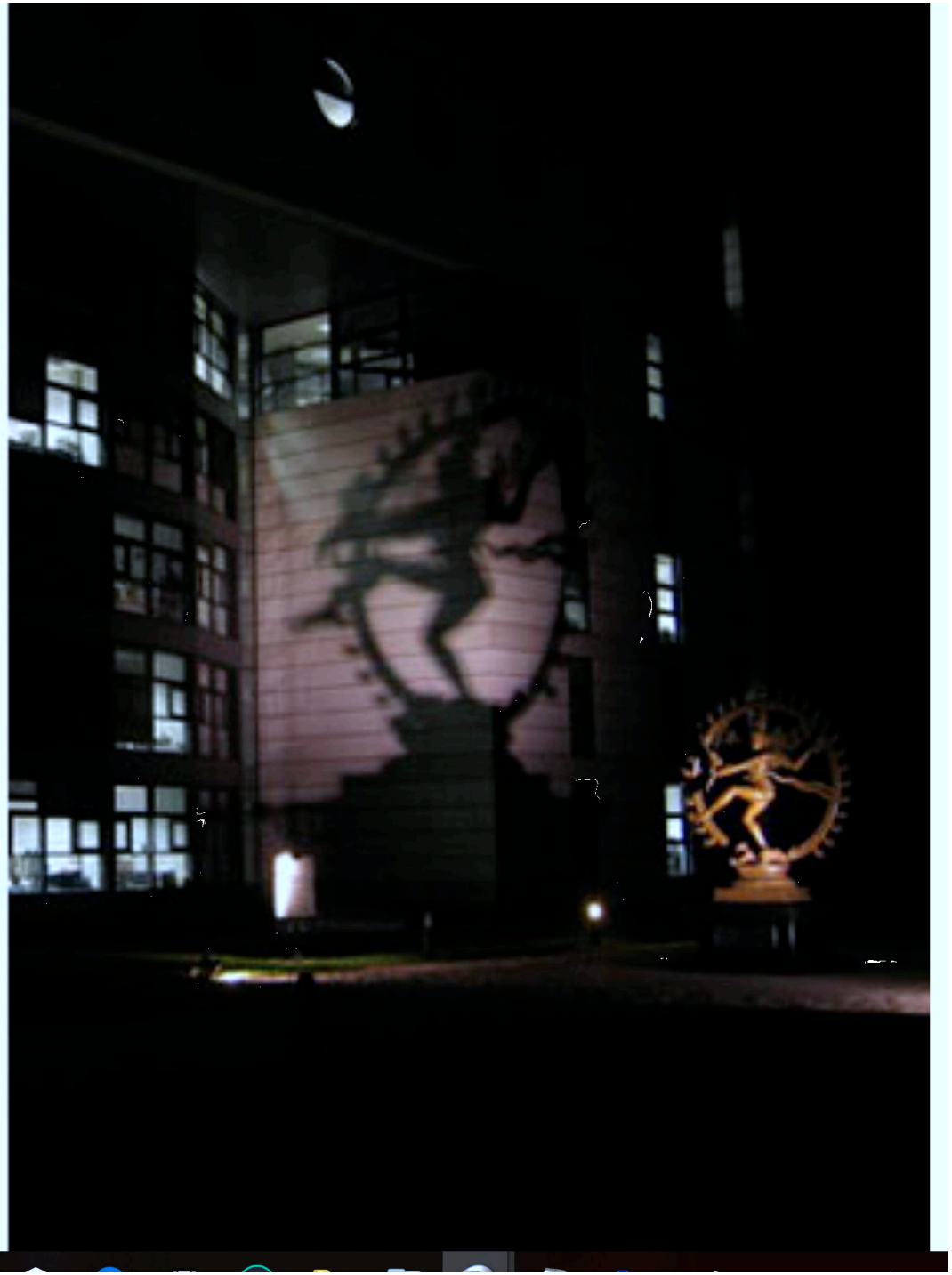

NATARAJA

Known as the Nataraja, this particular form of the Dancing Shiva is one of the greatest gifts to the world of art. Shiva symbolises "Shakti" or life force, in the Hindu Trinity. He is the Creator, the Sustainer and the Destroyer. Beyond the Nataraja's artistic form lies a profound meaning to be comprehended at many levels. The Nataraja in **Ananda Tandava** shows Him dancing the universe into existence, sustaining it with His rhythm and dancing it to extinction. Creation is sparked by the vibration of the drum in the right hand; protection or sustenance by the open palm of the front right arm, a gesture of assurance that grants freedom from fear. The fire in the left arm dissolves the universe while the front left arm points downward to the lifted left leg, the solace of the worlds. The dwarf representing ignorance is trampled under the right leg. The aureole represents the cosmos, the sun, moon and stars revolving in perpetual and fiery motion.

Ananda K. Coomaraswamy, seeing beyond the unsurpassed rhythm, beauty, power and grace of the Nataraja, once wrote of it "It is the clearest image of the activity of God which any art or religion can boast of".
More recently, Fritjof Capra explained that "Modern physics has shown that the rhythm of creation and destruction is not only manifest in the turn of the seasons and in the birth and death of all living creatures, but is also the very essence of inorganic matter", and that "For the modern physicists, then, Shiva's dance is the dance of subatomic matter".
It is indeed as Capra concluded: "Hundreds of years ago, Indian artists created visual images of dancing Shivas in a beautiful series of bronzes. In our time, physicists have used the most advanced technology to portray the patterns of the cosmic dance. The metaphor of the cosmic dance thus unifies ancient mythology, religious art and modern physics"...

Nataraja (Sanskrit: नटराज, translit. *Naṭarāja*, meaning "*the lord of dance*") is a depiction of the Hindu god Shiva as the cosmic ecstatic dancer. His dance is called Tandavam or Nadanta, depending on the context of the dance.[1][2] The pose and artwork is described in many Hindu texts such as the *Anshumadbhed agama* and *Uttarakamika agama*, the dance relief or idol featured in all major Hindu temples of Shaivism.[3]

The classical form of the depiction appears in stone reliefs, as at the Ellora Caves and the Badami Caves, by around the 6th-century.[4][5] Around the 10th century, it emerged in Tamil Nadu in its mature and best-known expression in Chola bronzes, of various heights typically less than four feet,[6] some over.[7] The Nataraja reliefs have been identified in historic artwork from many parts of South Asia, in southeast Asia such as in Bali, Cambodia, and in central Asia.[8][9][10]

The sculpture is symbolic of Shiva as the lord of dance and dramatic arts,[8] with its style and proportions made according to Hindu texts on arts.[6] It typically shows Shiva dancing in one of the *Natya Shastra* poses, holding Agni (fire) in his left back hand, the front hand in *gajahasta* (elephant hand) or *dandahasta* (stick hand) mudra, the front right hand with a wrapped snake that is in *abhaya* (fear not) mudra while pointing to a *Sutra* text, and the back hand holding a musical instrument, usually a *damaru*.[6] His body, fingers, ankles, neck, face, head, ear lobes and dress are shown decorated with symbolic items, which vary with historic period and region.[1][11] He is surrounded by a ring of flames, standing on a lotus pedestal, lifting his left leg (or in rare cases, the right leg) and balancing over a demon shown as a dwarf (Apasmara or Mulakaya[2]) who symbolizes ignorance.[6][12] The dynamism of the energetic dance is depicted with the whirling hair which spread out in thin strands as a fan behind his head.[13][14] The details in the Nataraja artwork have been variously interpreted by Indian scholars since the 12th-century for its symbolic meaning and theological essence.[7][15]

Nataraja is a well known sculptural symbol in India and popularly used as a symbol of Indian culture,[16][17] in particular as one of the finest illustrations of Hindu art.[18][19]

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Etymology [edit]

Nataraja iconography

The word Nataraja is a Sanskrit term, from नट *Nata* meaning "act, drama, dance" and राज *Raja* meaning "king, lord"; it can be roughly translated as *Lord of dance* or *King of dance*.[20][21] According to Ananda Coomaraswamy, the name is related to Shiva's fame as the "Lord of Dancers" or "King of Actors".[15]

The form is known as *Nataraja* in Tamil Nadu and as *Narteśvara* or *Nṛityeśvara* in North India, with all three terms meaning "Lord of the dance".[22] *Narteśvara* stems from *Nṛtta* same as *Nata* which means "act, drama, dance" and *Ishvara* meaning "lord".[23] *Natesa* (IAST: *Naṭeśa*) is another alternate equivalent term for Nataraja found in 1st-millennium sculptures and archeological sites across the Indian subcontinent.[24]

Depiction [edit]

The dance of Shiva in Tillai, the traditional name for Chidambaram, forms the motif for all the depictions of Shiva as Nataraja. He is also known as "Sabesan" which splits as "Sabayil aadum eesan" in Tamil which means "The Lord who dances on the dais". This form is present in most Shiva temples, and is the prime deity in the Nataraja Temple at Chidambaram.[25]

The two most common forms of Shiva's dance are the *Lasya* (the gentle form of dance), associated with the creation of the world, and the *Tandava* (the vigorous form of dance), associated with the destruction of weary worldviews - weary perspectives and lifestyles. In essence, the Lasya and the Tandava are just two aspects of Shiva's nature; for he destroys in order to create, tearing down to build again.[26]

According to Alice Boner, the historic Nataraja artworks found in different parts of India are set in geometric patterns and along symmetric lines, particularly the *satkona* mandala (hexagram) that in the Indian tradition means the interdependence and fusion of masculine and feminine principles.[27] Nataraja is also shown with his wife Parvati as they dance together.[*citation needed*]

Characteristics [edit]

As the Lord of Dance, Nataraja, Shiva performs the *Ananda Tandava* (dance of bliss), the dance in which the universe is created, maintained, and dissolved. The symbolism in the art has been variously interpreted by scholars since the Chola

Nataraja

The Lord of the Dance

A 10th century Chola dynasty bronze sculpture of Shiva, the Lord of the Dance at the Los Angeles County Museum of Art

Affiliation	Shiva
Symbols	Agni
Texts	*Anshumadbhed agama* *Uttarakamika agama*

Part of a series on

Shaivism

Deities [hide]

Paramashiva
(Supreme being)
Shiva
Sadasiva · Bhairava · Rudra · Virabhadra
Shakti
Parvati · Sati · Durga · Kali · Ganesha · Murugan · Ayyappan · Shiva forms · Others

Scriptures and texts [hide]

Vedas · Upanishads (Svetasvatara) · Agamas and Tantras · Shivasutras · Tirumurai · Vachanas

As the Lord of Dance, Nataraja, Shiva performs the *Ananda Tandava* (dance of bliss), the dance in which the universe is created, maintained, and dissolved. The symbolism in the art has been variously interpreted by scholars since the Chola empire era:[6][15][28]

- He dances within a circular or cyclically closed arch of flames (*prabha mandala*), which symbolically represent the cosmic fire that in Hindu cosmology creates everything and consumes everything, in cyclic existence or cycle of life. The fire also represents the evils, dangers, heat, warmth, light and joys of daily life. The arch of fire emerges from two *makara* on each end, which are water creatures and part of Hindu mythologies.
- His legs are bent, which suggests an energetic dance. His long, matted tresses, are shown to be loose and flying out in thin strands during the dance, spread into a fan behind his head, because of the wildness and ecstasy of the dance.
- On his right side, meshed in with one of the flying strands of his hair near his forehead, is typically the river Ganges personified as a goddess, from the Hindu mythology where the danger of a mighty river is creatively tied to a calm river for the regeneration of life.
- The upper right hand holds a small drum shaped like an hourglass that is called a *ḍamaru* in Sanskrit.[29][30] A specific hand gesture (mudra) called *ḍamaru-hasta* (Sanskrit for "*ḍamaru*-hand") is used to hold the drum.[31] It symbolizes rhythm and time.
- The upper left hand contains *Agni* or fire, which signifies forces of creation and destruction. The opposing concepts show the counterpoise nature of life.
- A cobra uncoils from his lower right forearm, while his palm shows the *Abhaya* mudra (meaning *fearlessness* in Sanskrit), suggesting not to fear nearby evil, as well as evil and ignorance surrounding the devotee as he or she follows the righteousness of *dharma*.
- The lower left hand is bent downwards at the wrist with the palm facing inward(away from the viewer) and points towards the raised left foot so that it is diametrically opposite to the lower right arm(*Abaya mudra*).
- The face shows two eyes plus a slightly open third on the forehead, which symbolize the triune in Shaivism. The eyes represent the sun, the moon and the third has been interpreted as the inner eye, or symbol of knowledge (*jnana*), urging the viewer to seek the inner wisdom, self-realization. The three eyes alternatively symbolize an equilibrium of the three Guṇas: Sattva, Rajas and Tamas.
- The dwarf on which Nataraja dances is the demon *Apasmara purusha* (Muyalaka, as it is known in Tamil), and which symbolises action and dance that leads to victory over demonic evil and ignorance.
- The slightly smiling face of Shiva represents his calmness despite being immersed in the contrasting forces of universe and his energetic dance.[7]

The above interpretations of symbolism are largely based on historic Indian texts published in and after 12th-century, such as *Unmai Vilakkam*, *Mummani Kovai*, *Tirukuttu Darshana* and *Tiruvatavurar Puranam*.[15] Padma Kaimal questions some of these interpretations by referring to a 10th-century text and Nataraja icons, suggesting that the Nataraja statue may have symbolized different things to different people or in different contexts, such as Shiva being the lord of cremation or as an emblem of Chola dynasty.[32] In contrast, Sharada Srinivasan questions the link to Chola, and has presented archaeological evidence suggesting that Nataraja bronzes and dancing Shiva artwork in South India was a Pallava innovation, tracing back to 7th to 9th-centuries, and its symbolism should be pushed back by a few centuries.[33]

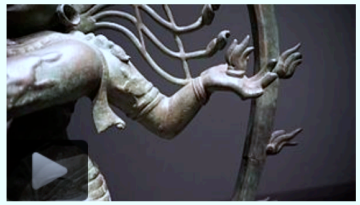
Significance [edit]

An essential significance of Shiva's dance at Tillai, the traditional name of Chidambaram, can be explained as:[34]

- First, it is seen as the image of his rhythmic or musical play which is the source of all movement within the universe. This is represented by the circular or elliptical frame surrounding Shiva.
- Secondly, the purpose of his dance is to release the souls of all men from the snare of illusion.
- Lastly, the place of the dance, Chidambaram, which is portrayed as the center of the universe, is actually within the heart.

Nataraja, states James Lochtefeld, symbolizes "the connection between religion and the arts", and it represents Shiva as the lord of dance, encompassing all "creation, destruction and all things in between".[35] The Nataraja iconography incorporates contrasting elements,[16] a fearless celebration of the joys of dance while being surrounded by fire, untouched by forces of ignorance and evil, signifying a spirituality that transcends all duality.[36]

Nataraja is a significant visual interpretation of Brahman and a dance posture of Shiva. The details in the Nataraja artwork has attracted commentaries and secondary literature such as poems detailing its theological significance.[7][15] It is one of the widely studied and supreme illustrations of Hindu art from the medieval era.[37][38]



History [edit]

See also: Pancha Sabhai

One of earliest known Nataraja artworks has been found in the archaeological site at Asanapat village in Odisha, which includes an inscription, and is dated to about the 6th century CE.[39] The Asanapat inscription also mentions a Shiva temple in the Saivacaryas kingdom. Literary evidences shows that the bronze representation of Shiva's ananda-tandava appeared first in the Pallava period between 7th century and mid-9th centuries CE.[40]

Stone reliefs depicting the classical form of Nataraja are found in numerous cave temples of India, such as the Ellora Caves (Maharashtra), the Elephanta Caves, and the Badami Caves (Karnataka), by around the 6th-century.[4][5] Archaeological discoveries

Tirumurai · Vachanas

Philosophy [hide]

Three Components
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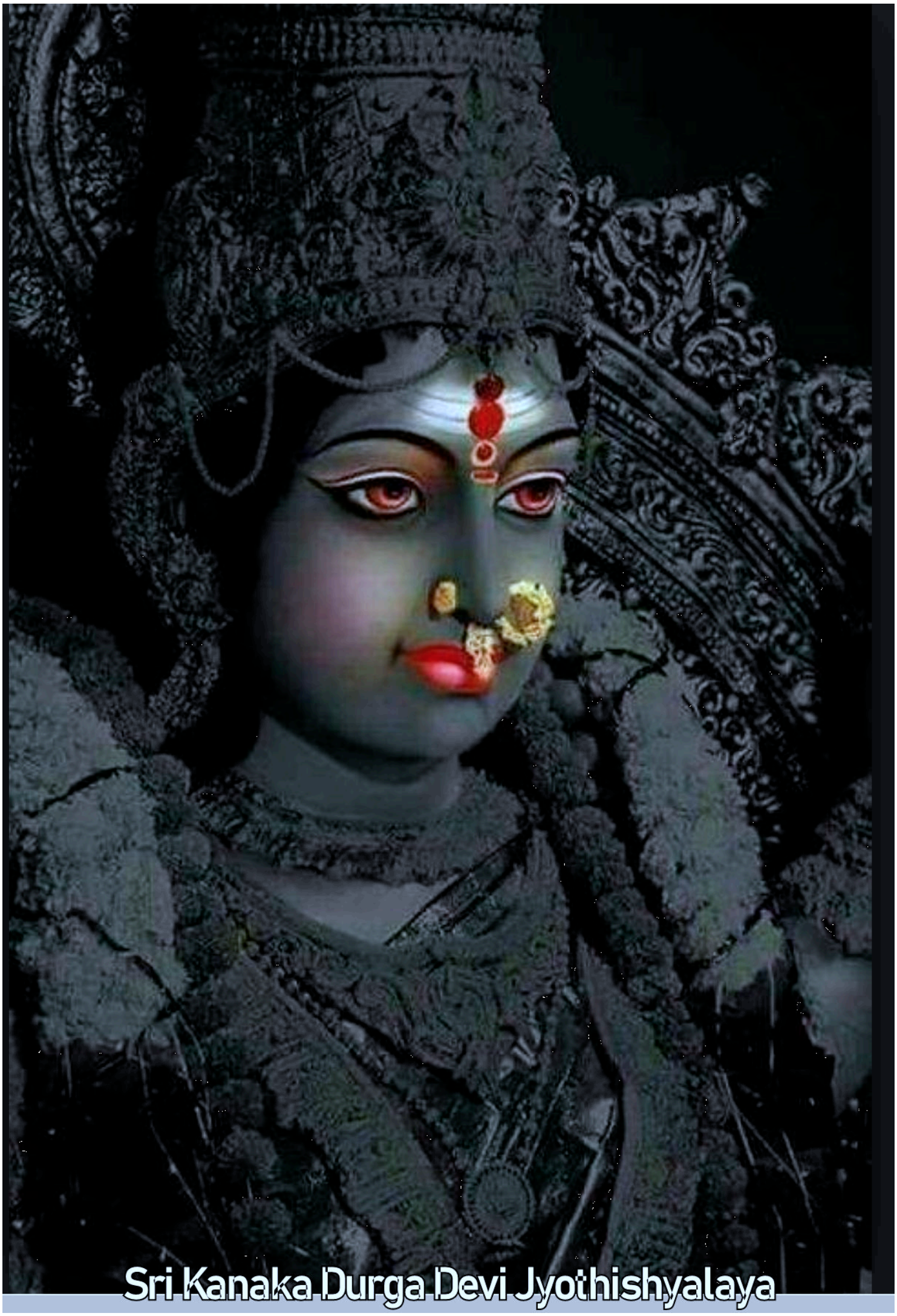
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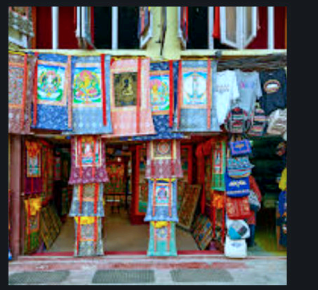

Trimurti statue with three heads of Sh.

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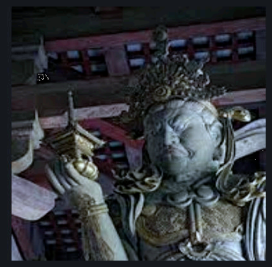

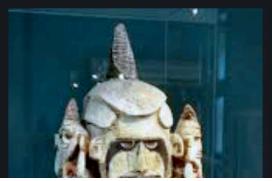

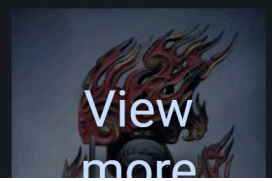

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Thangka paintings on display include pieces by various Master painters like Som Bahadur Lama, Sunu Lama, Sagar Lama and Bikash Lama, to name a few.

The gallery of paintings includes Sakyamuni Buddha, Guru Padmasambhava aka Guru Rinpoche, Vajrasattva, 1000 Arms & 4 Arms Avaloketishvara (Cherenzi), Medicine Buddha, Zhambala (for wealth), Green Tara and 21 Taras, Amitabha/Amitayus, The Wheel of Life, Mandalas, wrathful deities Mahakala, Yamantaka, Vajrakilaya, and many more. Tibetan Buddha statues & singing bowls will be available too.

Thangkas are Tibetan Paintings used for spiritual practices or displayed as art. As an object of devotion, and a source of blessings, a Thangka usually portrays the Buddha, Bodhisattva, Meditational Deity, Great Teachers and Mandalas.

All items can be purchased at the exhibition and part of the sales proceeds goes to the Buddhist Library.

FROM THURSDAY, 13 MAY 2010 to WEDNESDAY, 9 JUNE 2010

EXHIBITION TIME
12:00pm - 9:00pm from Tuesday to Saturday
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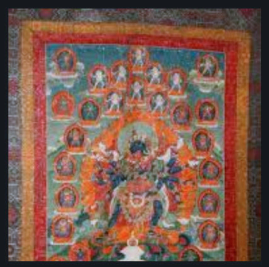

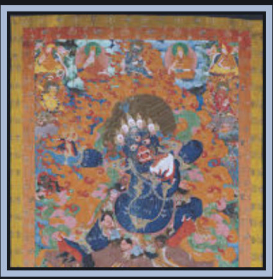

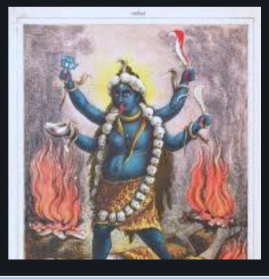

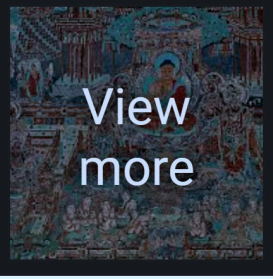

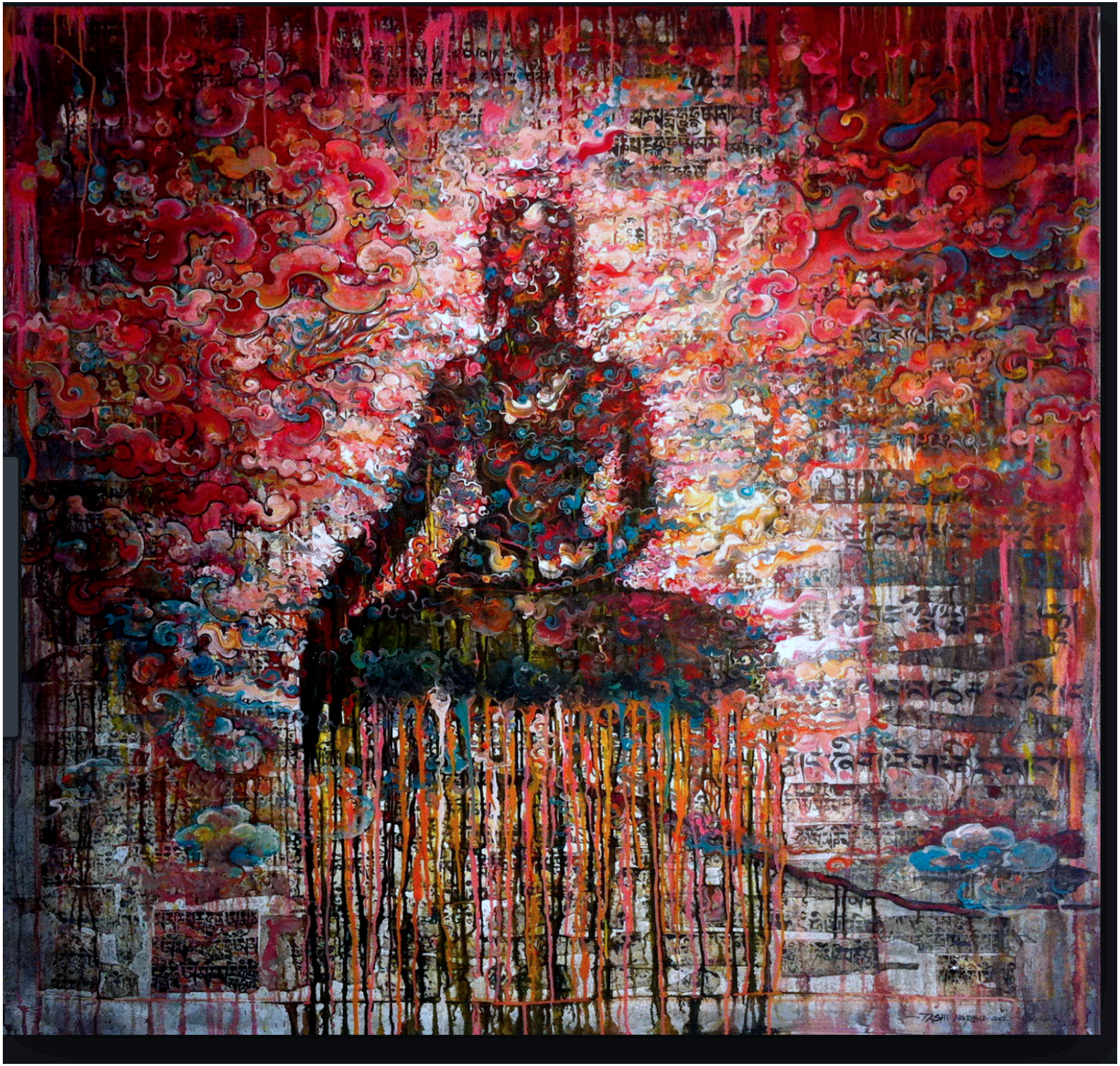

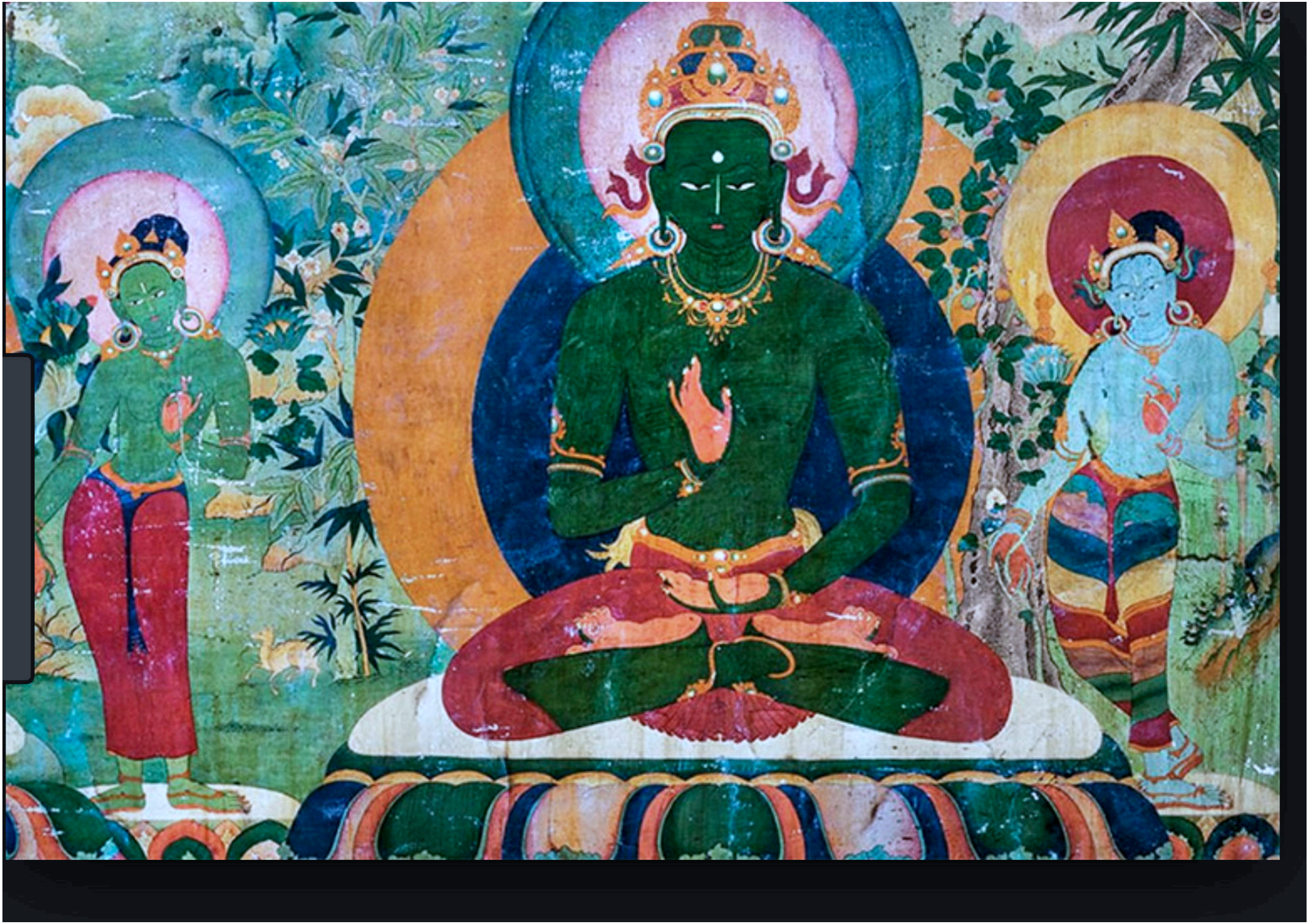

PAATLE-1

Plenipotentiary of Atlan, Amexem, Turtle Island Land of the Frogs, Egypt of the West.

To all whom these presents shall come, Greetings:

I Authorize, Authenticate and Certify this document is an Atlantean Document confirming :Diani-Naja:Bey-El, Matriarch of the At-sik-hata Nation of Yamassee Moors and Matriarch of Atlan (United Nations IPO #2718) with the Geographic Coordinates of: 33° 36' 36" North-Latitude and 84° 17' 17" West-Longitude is in fact on the Land which is: Atlan, Amexem, Turtle Island, Land of the Frogs see: http://indigenous9.tripod.com [Misnomer: United States, Canada Mexico] and is outside of the Corporate U.S. [Title 28 U.S.C. SEC 3002(15)] which is a Federal Corporation that no longer exists on land and is now Located in the Middle of the Atlantic Ocean; Geographic coordinates: 0° 00' 00" North Latitude and 25° 00' 00" West Longitude see: http://www.youtube.com/watch?v=_NMu1mFao3w - Rep. Kanjorski: $550 Billion Disappeared in "Electronic Run On the Banks" . My Authorization is: Valid, Legal, Lawful & Commercially Enforceable. Commercial Publication of this Authentication at: http://sites.google.com/site/authenticexport/atsikhata.

For Universal, Quantum and Commercial Claims, I, :Nanya-Shaabu:El – Plenipotentiary of Atlan, Autograph, Seal and Place My Postage Stamp on this Instrument, this SIXTH-DAY OF July 2009.

In accord with: The Hague Statue on Private International law
Uniform Commercial Code, United Nations Convention on Economic, Social & Cultural Rights
Untied Nations Convention on Civil & Political Rights
Congressional Record page A3220 May 11, 1955, House Resolution HJ 3 IH
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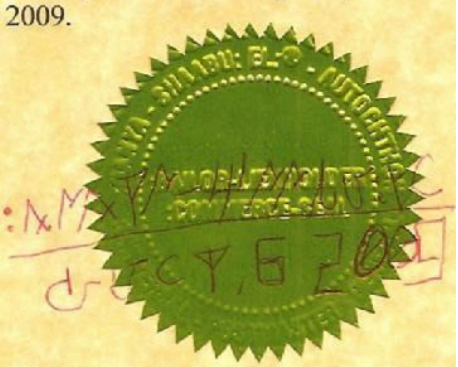

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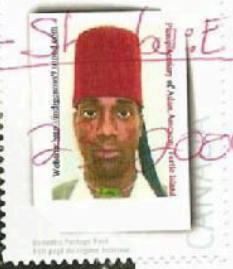
UCC 3-501: HJR-192
TITLE 31 USC § 5118
EXEMPT FROM LEVY

:Nanya-Shaabu:El



INTERNATIONAL COMMERCIAL CLAIM OF INDIGENOUS LAND UCC 1-202

INDIGENOUS LAND OF ATLAN/TURTLE ISLAND

The White House: 1600 Pennsylvania Avenue, Washington, D.C.,[20500]

MARCH 17, 2009 EXPORT DECLARATION: RA276919258US

http://indigenous9.tripod.com U.S. Dept of State Authentication No. 060201440-3 of May 22, 2006 signed by U.S. Secretary of StateCondoleeza Rice. web: http://naturalcredit.tripod.com

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U.C.C. 9-607. U.C.C 9-609

This Structure with the Geographic Co-ordinates: 38 deg. 52' 52" N.Lat and 77 Deg. 02' 12" W.long and this Land is INDIGENOUS PROPERTY **of the Plenipotentiary of Atlan: :Nanya-Shaabu:El .**
see: http://sites.google.com/sites/autochthonquantumclaims/fortheclaimofthelocation

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ACCEPTED FOR VALUE & CONSIDERATION & HONOR
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By: :Nanya-Shaabu:El - Plenipotentiary of Atlan
Date: May 23, 2009
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:Nanya-Shaabu:EL

By: :Nanya-Shaabu:EL
Plenipotentiary of Allan
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06024440-3 - United States of America - Department of the Treasury
May 22, 2006 See: http://natural credit.tripod.com
8 USC 1443(f); 22 USC 2657; 22 USC 2659 a

http://naturalcredit.tripod.com

:Nanya-Shaabu:EL

May 31 2009

:Nanya-Shaabu:EL

:Nanya-Shaabu:EL

FOR THIS CLAIM OF THE LOCATION **IS** WITH THE KNOWLEDGE OF THIS CLAIMANT. FOR THIS CLAIM OF THE LOCATION **IS WITH** THE CLAIM OF THE ATLAN,AMEXEM,TURTLE-ISLAND, LAND-OF-THE-FROGS BY THE CANADA-POST-REGISTERED MAIL Number: RT~076~577~059 CA(:October ~31, ~2008), WITH THE :COPYCLAIM OF THE :AUGUST ~29~2008 BY THE PUBLICATION-BROADCASTING-PUBLISHING OF THESE CLAIMS BY THIS WEBSITE: http://sites.google.com/site/autochthonquantumclaims/fortheclaimofthelocation. FOR THIS CLAIM OF THE LOCATION IS WITH THESE GEO-GRAPHIC-COORDINATES OF THIS WORLD/PLANET-EARTH/BI-AXEL-ELLIPTOID/VESSEL-IN-A-SEA-OF-SPACE/ BY THESE NAMES: KI/TIAMAT/ARDUWT/TA/ZURRUQIYYA WITHIN THIS EIGHTEENTH-GALAXY.

FOR THIS CLAIM OF THE LOCATION **IS WITH** THE KNOWLEDGE OF THIS AUTOCHTHON-CLAIMANT-PLENIPOTENTIARY-[IN]DI-GEN[OUS] ,PLENIPOTENTIARY-MASTER,UNIVERSAL-POSTMASTER, POSTMASTER-GENERAL, POSTMASTER-BANKER-JUDGE, MELANINITE-TARITE, CHRYSTOMELLOS,[O]CCULTUM, NIGRUM-NIGRIUS-NIGRO, MAKU/CHIEF OF THE :AT-SIK-HATA NATION OF THE YAMASSEE-MUURS/MOORS, MOORISH-NOBILITY, [AB]ORIGINAL, :Nanya-Shaabu:El (RA~276~9 I 9~258US, March ~17~ 2008) BY THIS PUBLISHING-BROADCASTING-PUBLICATION WITH THE USE OF THE [IN]TERNET/WORLD-WIDE-WEB. FOR THE WITNESSING OF THIS CLAIM IS WITH THE KNOWLEDGE OF THIS WITNESS-CLAIMANT AND THIS CLAIM'S EXISTENCE. FOR THIS CLAIM OF THE **LOCATION IS WITH THE LOCATION OF THE ATLAN,AMEXEM, TURTLE- ISLAND , THE-LAND- OF-THE- FROGS, THE-EGYPT- OF-THE-WEST WITH THE FOLLOWING GEO-GRAPHIC-COORDINATES:** THE VATICAN- CITY WITH THE LOCATION OF THE ~41° ~53' ~60" WITH THE NORTH-LATITUDE AND THE ~12° ~26' ~60" WITH THE EAST-LONGITUDE, THE PENTAGON WITH THE LOCATION OF THE ~38° ~52' ~16" WITH THE NORTH-LATITUDE AND THE ~77° ~03' ~21" WITH THE WEST-LONGITUDE/ ~38.87099, ~~7705596, THE ROYAL COURTS OF (THE) JUSTICE WITH THE LOCATION OF THE ~51° ~30' ~49" WITH THE NORTH-LATITUDE AND THE ~00° ~06' ~48" WITH THE WEST-LONGITUDE, THE CITY OF (THE) LONDON/ THE TEMPLE-BAR WITH THE LOCATION OF THE ~51° ~30' ~49" WITH THE NORTH-LATITUDE AND WITH THE ~00° ~06' ~43" WITH THE WEST-LONGITUDE, THE INNS-OF-(THE)COURT WITH THE LOCATION OF THE ~27° ~28' ~9" WITH THE SOUTH-LATITUDE AND THE ~153° ~01' ~14" WITH THE EAST-LATITUDE, THE MIDDLE-TEMPLE WITH THE LOCATION OF THE ~51° ~30' ~48" WITH THE NORTH-LATITUDE AND THE ~00° ~06' ~42" WITH THE WEST-LONGITUDE, THE INNER-TEMPLE WITH THE LOCATION OF THE ~51° ~30' ~49" WITH THE NORTH-LATITUDE AND THE ~00° ~06' ~40" WITH THE WEST-LONGITUDE, THE GRAY'S-INN WITH THE LOCATION OF THE ~51° ~31' ~11.10" WITH THE NORTH-LONGITUDE AND THE ~00° ~06' ~46.39" WITH THE WEST-LONGITUDE, THE LINCOLN'S-INN WITH THE LOCATION OF THE ~51° ~31' ~01.65" WITH THE NORTH LATITUDE AND THE ~00° ~06' ~52.48" WITH THE WEST-LONGITUDE, THE DI-STRICT OF (THE) COLUMBIA/ WASHINGTON, D.C. WITH THE LOCATION OF THE ~38° ~54' ~18" WITH THE NORTH-LATITUDE, AND THE ~77° ~00' ~58" WITH THE WEST-LONGITUDE(WITH THE ALTITIDE OF THE TWO METRES AND THE NINE-FEET/ ~2 METERS, ~9 FEET), THE WHITE HOUSE WITH THE LOCATION OF THE ~38° ~53' ~52" WITH THE NORTH-LATITUDE AND THE ~77° ~02' ~12" WITH THE WEST-LONGITUDE/38.89767, ~~77.03655, THE UNIT[ED]- STATES / UNIT[ED]-STATES- OF-THE- [A]MERI[CA] (:TITLE ~28 :U.S.C.:SECTION: ~3002(~15) = **THE-MATRIX**) WITH THE LOCATION OF THE ~30° ~00' ~00" WITH THE NORTH-LATITUDE AND THE ~97° ~00' ~00" WITH THE WEST LONGITUDE, THE PARLIAMENT OF (THE)CANADA WITH THE LOCATION OF THE ~60° ~00' ~00" WITH THE NORTH-LATITUDE AND

THE ~95° ~00' ~00" WITH THE WEST LONGITUDE/ ~45.4246900 WITH THE LATITUDE AND THE ~~ 75.7009510 WITH THE LONGITUDE, THE COUNTRY OF THE MEXICO WITH THE LOCATION OF THE ~23° ~00' ~00" WITH THE NORTH-LATITUDE AND THE ~102° ~00' ~00" WITH THE WEST-LONGITUDE, THE CAPITOL OF THE STATE OF (THE) GEORGIA WITH THE LOCATION OF THE ~33° ~44' ~57.38" WITH THE NORTH-LATITUDE, ~84° ~23' ~17.74" WITH THE WEST-LONGITUDE, THE CITY OF (THE) MACON, GEORGIA WITH THE LOCATION OF THE ~32° ~50' ~05" WITH THE NORTH-LATITUDE AND THE ~83° ~39' ~06" WITH THE WEST-LONGITUDE/ 32.834839 WITH THE LATITUDE AND THE~83.657672 WITH THE LONGITUDE, THE PROVINCE OF (THE) ALBERTA WITH THE LOCATION OF THE ~55° ~00' ~00" WITH THE NORTH-LONGITUDE AND THE~115° ~00' ~00" WITH THE WEST-LONGITUDE, THE ALBERTA LEGISLATURE WITH THE LOCATION OF THE ~53° ~32' ~01" WITH THE NORTH-LATITUDE, ~113° ~30' ~24" WITH THE WEST-LONGITUDE/ ~53.5333714 WITH THE LATITUDE, ~-113.506531 WITH THE LONGITUDE, THE MEXICO-CITY WITH THE LOCATION OF THE ~19° ~24' ~00" WITH THE NORTH-LATITUDE AND THE ~99° ~07' ~00" WITH THE WEST-LONGITUDE/ ~19.4 WITH THE LATITUDE, ~ -99.117 WITH THE LONGITUDE, THE CITY OF (THE) [E]DMONTON WITH THE LOCATION OF THE ~53° ~34' ~00" WITH THE NORTH-LATITUDE AND THE ~113° ~30' ~00" WITH THE WEST-LONGITUDE/ ~53.567 WITH THE LATITUDE AND THE ~-113.517 WITH THE LONGITUDE, MISERCORDIA HOSPITAL WITH THE LOCATION OF THE ~53° ~31' ~13" WITH THE NORTH-LATITUDE AND THE ~113° ~36' ~39" WITH THE WEST-LONGITUDE/ ~53.522028 WITH THE LATITUDE AND THE ~-113.61083 WITH THE LONGITUDE.

FOR THE SILENCE-MUTENESS-QUIETNESS-LACK-OF-THE-[RE]SPONSE OF THE-FICTION-BANKING/FICTION-COURT-HOUSES/FICTION-COMMERCE/FICTION-CONTRACTS/ FICTION-JURISDICTION/FICTION-JUDGE-CLERK-[A]DMINISTRATOR/FICTION-MAGISTRATE-JUDGE/FICTION-PUBLIC-[OF]FICI[AL] **IS WITH** THE KNOWLEDGE OF THE-LACK-OF-THE-CLAIM/LACK-OF- THE-AUTHORITY/ LACK-OF-THE-AUTHORIZATION/ LACK-OF-THE-VENUE /LACK- OF-THE-JURISDICTION/LACK-OF-THE-STANDING/LACK-OF-THE-SUBJECT-MATTER-JURISDICTION AGAINST THE PLENIPOTENTIARY-MASTER, UNIVERSAL-POSTMASTER, KING, MELANINITE, CHRYSTOMELLOS, [OC]CULTUM,NIGRUM-NIGRIUS-NIGRO, SOVEREIGN, [IN]DI-GEN[OUS]-CLAIMANT-MASTER, POSTMASTER-BANKER-JUDGE OF THE ATLAN :Nanya-Shaabu:El: BY THE FICTION-JURISDICTION/FICTION-CORPORATIONS. FOR THE VESSEL-IN-THE-DRY-DOCK-TITLED-IN-THE–PUERTO-RICO(RACKATEERING) OF THE FICTION-JURISDICTION/FICTION-COMMERCE **IS WITH** THE KNOWLEDGE OF THE LAND-OF-THE-ATLAN,AMEXEM,TURTLE-ISLAND, LAND-OF-THE-FROGS. FOR THE [DIS]CLOSURE OF THIS CLAIM IS WITH THE VACATING-VOIDING-[E]STOPPEL OF ALL FICTION-COMMERCE-CONTRACTS AND FOR THE COMPENSATION-RESTITUTION/ PUNITIVE-DAMAGES, CUMULATIVE-DAMAGES, QUANTUM-DAMAGES, RETURN-OF-THE-LAND, VACATING-OF-THE-LAND, VACATING-OF-THE-COMMERCE,GIVE-BACK-OF-THE-MONIES,PAYMENT-OF-THE-MONIES,SETTLEMENT-OF-THE-CLAIMS OF THE KING, MELANINITE,CHRYSTOMELLOS,[OC]CULTUM,NIGRUM-NIGRIUS-NIGRO, SOVEREIGN, [IN]DI-GEN[OUS]-CLAIMANT-MASTER AND THE PLENIPOTENTIARY OF THE ATLAN AGAINST THE FICTION-CONTRACTS/FICTION-OPERATIONS/FICTION-COMMERCE FOR ITS OPERATIONS WITHIN THE GEO-GRAPHIC-LOCATIONS OF THE ATLAN **WITHOUT** THE CONSENT-PERMISSION-AUTHORIZATION-GRANTING OF THE PLENTIPOTENTIARY OF THE ATLAN, TURTLE-ISLAND, LAND-OF-THE-FROGS,:Nanya-Shaabu:El.

~10 MONTH ~2ND DAY Year 63 of our Deity Amun-Re.
:COPYCLAIM :JANUARY ~4, 2009.

:Nanya-Shaabu:El

:Autochthon/Plenipotentiary-Master of The Atlan
:Autograph/:CopyClaim

~2 OF THE ~2

:Nanya-

July 6

FOR THE CERTIFICATION OF THE [EX]PORT-[DE]CLARATION/ QUANTUM-PORT-CLAIM.

FOR THE CERTIFICATION OF THIS [EX]PORT-[DE]CLARATION/ QUANTUM-PORT-CLAIM IS WITH THE AUTHORITY OF THE PLENIPOTENTIARY OF THE ATLAN,AMEXEM,TURTLE-ISLAND,LAND-OF-THE-FROGS.

FOR THE AUTHORITY-AUTHORIZATION-AUTHENTICATION OF THIS ATLANTEAN-DOCUMENT-VESSEL-CONTRACT/COMMERCE-DOCUMENT-CLAIM-PAATLE~1 IS WITH THE AUTHORITY-AUTHORIZATION-CERTIFICATION OF THE PLENIPOTENTIARY OF THE ATLAN,AMEXEM,TURTLE-ISLAND,LAND-OF-THE-FROGS, :Nanya-Shaabu:El BY THE PUBLISHING OF THIS CLAIM: http://sites.google.com/site/autochthonquantumclaims/fortheclaimofthelocation. FOR THE GEO-GRAPHIC LOCATION OF THE ATLAN, AMEXEM,TURTLE-ISLAND,LAND-OF-THE-FROGS IS WITH THESE COORDINATES: ~30°~00'~00" WITH THE NORTH-LATITUDE AND WITH THE ~97°~00'~00" WEST-LONGITUDE, FOR THE LOCATION OF THE UNIT[ED]-STATE[S]-CORPORATION (UNITED-STATES-CORPORATION (sic) (:TITLE ~28 :U.S.C. :SECTION ~ 3002(~15) = **THE MATRIX**)) IS WITH THESE GEO-GRAPHIC COORDINATES: 0° 00' 00" NORTH-LATITUDE AND WITH THE 25° 00' 00" WITH THE WEST-LONGITUDE (MIDDLE OF THE ATLANTIC OCEAN, THEREFORE THE CORPORATION IS ON WATER AND SINKING) see: http://www.youtube.com/watch?v=_NMu1mFao3w - Rep. Kanjorski: $550 Billion Disappeared in "Electronic Run On the Banks")) . FOR THE LACK OF THE [RE]SPONSE IS WITH THE KNOWLEDGE OF THE PLENIPOTENTIARY OF THE ATLAN, AMEXEM,TURTLE ISLAND/ LAND-OF-THE-FROGS (http://indigenous9.tripod.com), FOR THE KNOWLEDGE OF THE AUTHORIZATION OF THIS ATLANTEAN-DOCUMENT-VESSEL-CONTRACT-CLAIM IS WITH THE PUBLISHING BY THIS WEBSITE: http://sites.google.com/site/authenticexport/atsikhata . FOR THE AUTHORITY-AUTHORIZATION-AUTHENTICATION-CERTIFICATION OF THIS ATLANTEAN-DOCUMENT-VESSEL-CONTRACT/COMMERCE-DOCUMENT/[EX]PORT-[DE]CLARATION/ QUANTUM-PORT-CLAIM- PAATLE~1 IS WITH THE USE BY THIS WITNESS-PARTY/CLAIMANT-PARTY/AUTOCHTHON/MATRIARCH :Diani-Naja:Bey-El FOR THE LOCATION ON THE ATLAN BY THESE GEOGRAPHIC-COORDINATES: ~33°~ 36' ~36" WITH THE NORTH-LATITUDE AND WITH THE ~84° ~17'~17" WITH THE WEST-LONGITUDE. FOR THIS WITNESS-PARTY/CLAIMANT-PARTY/AUTOCHTHON/MATRIARCH OF THE AT-SIK-HATA NATION :Diani-Naja:Bey-El IS WITH THE ATLAN, AMEXEM,TURTLE ISLAND/ LAND-OF-THE-FROGS, TERRA-TA-ZURUQIYYA-GI-GAIA-KI AND **WITHOUT** THE UNIT[ED]-STATE[S]-CORPORATION (UNITED-STATES-CORPORATION (sic) (:TITLE ~28 :U.S.C. :SECTION ~ 3002(~15) = **THE MATRIX**)) WITH THESE GEO-GRAPHIC COORDINATES: 0° 00' 00" NORTH-LATITUDE AND WITH THE 25° 00' 00" WITH THE WEST-LONGITUDE (MIDDLE OF THE ATLANTIC OCEAN, THEREFORE THE CORPORATION IS ON WATER AND SINKING) see: http://www.youtube.com/watch?v=_NMu1mFao3w - Rep. Kanjorski: $550 Billion Disappeared in "Electronic Run On the Banks")). FOR THE PLENIPOTENTIARY OF THE ATLAN,AMEXEM,TURTLE-ISLAND,LAND-OF-THE-FROGS, IS WITH THE PLACEMENT OF HIS AUTOGRAPH,SEAL,POSTAGE-STAMP WITH THIS [EX]PORT-[DE]CLARATION/ QUANTUM-PORT-CLAIM WITH THIS SIXTH- DAY OF THE JULY ~2009. FOR THE COMPLIANCE WITH THIS [IN]STRUMENT-CONTRACT-CLAIM IS WITH THE HAGUE STATUTE-ON-THE-PRIVATE-[IN]TERNATION[AL]-LAW, UNIFORM-COMMERCE-CODE, UNIT[ED]-NATIONS-CONVENTION-ON-THE-ECONOMIC-SOCIAL AND THE CULTURAL-RIGHTS, UNIT[ED]-NATIONS-CONVENTION ON THE–CIVIL-AND-THE-POLITICAL-RIGHTS, CONGRESS[IONAL]-RECORD-PAGE: A~3220-MAY~11,~1955, HOUSE-[RE]SOLUTION(HJ ~3IH).

:Nanya-Shaabu:El

July 6, 2009

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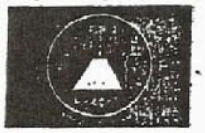
http://sites.google.com/site/autochthonquantumclaims/fortheclaimofthelocation

060200513869

Juanita Hicks
Clerk of Superior Court
Fulton County, Georgia

Affidavit Statement of Fact of Autochthon/ Indigenous Standing



Fact 1.

The Following Autochthons/Indigenous People of this Clan are the Secured Parties on this Commercial Financing Statement.

6. [:Nanya-Shaabu:El: ®], Maku(Chief) of the At-sik –hata Clan of Yamassee Native American Moors file numbers: 11 03 2019, 11 04 1486, 11 05 1967, 01120051688, 11051871, - Bibb county ; 06200511271/Fulton County,Georgia Security agreements: 1971-002 , HHIA SWHB-200271, Bibb County, Georgia.
7. Diani Naja Ba'al Mashiah Bey-El ©TM - , Commercial Security Agreement 08051947/Fulton County, Georgia.
8. Nanya Nagub Chaka El©TM – Commercial Security Agreement 19510329, Financing Statement # 11051593, Bibb County, Georgia.
9. Nin Amunett El©TM – Commercial Security Agreement 19680530 , Financing Statement # 11051592 , Bibb County, Georgia.
10. [:Teref:Ankh: ®] - 442003000140/Dekalb County, Georgia.

The Flesh and Blood Living Souls of At-sik-Hata Clan are not corporations, fictions or artificially created entities. No Corporation or artificially created entity can or may have a claim against the secured parties of the At-sik-hata Clan and the At-sik-hata Clan of Yamassee Native Am[illegible]an Moors.

As Maku(Chief) of the At-sik-Hata Clan I state under penalty of perjury under the laws of the Yamassee/U.N.N.M Constitution from the first statute to the last, that All the Indigenous , Living Souls mentioned here are some of the members of our Clan. Any additions or amendments to this document shall be carried out by Me or a designated Agent of At-sik-Hata Clan.

As it is said so it shall be. Kawunfii..

Sunday, May 24, 2009

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E-mail Address: kemit19@gmail.com

Subject: Thw White House is on Indige

this message also posted @ www.twitter.com/kham19

By: Nanya-Shaabu:El - Plenipotentiary of Atlan, Amexem, Turtle Island, Land of the Frogs
Date: May 23, 2009

RT 076 577 059 CA

:Nanya-Shaabu:El

August 2008

FOR THE BEGINNING OF ALL THINGS IS WITH THE FIRST-USING OF THE ALL.

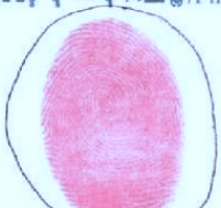
FOR THE BLESSINGS AND THE HOLY-NAME OF THE GREAT NETER USIR IS WITH THE SON OF THE GEB AND THE NUT FOR THE CHILDREN OF THE MAJESTY OF THE AMUN-RE.

CLAIM OF THE ATLAN,AMEXEM,TURTLE-ISLAND,LAND-OF- THE- FROGS.

FOR THIS CLAIM OF THE ATLAN,AMEXEM,TURTLE-ISLAND,LAND-OF- THE- FROGS [MISNOMER: THE UNITED STATES, THE UNITED STATES OF AMERICA, CANADA, MEXICO, NORTH AMERICA, THE UNITED STATES OF NORTH AMERICA] IS WITH THIS PUBLISHING OF THIS CLAIM BY THE PLENIPOTENTIARY-MASTER,POSTMASTER-GENERAL-BANKER-JUDGE, AUTOCHTHON, MELANINITE, TARITE, MUUR/MOOR, MOORISH-NOBILITY, [AB]ORIGINAL, :Nanya-Shaabu:El (RA~276~919~258US :March ~17~ 2008).

:Picture

:Finger-Print



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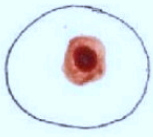
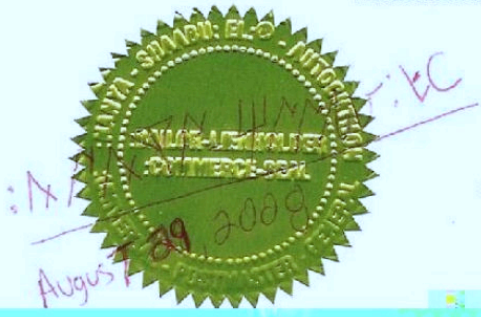


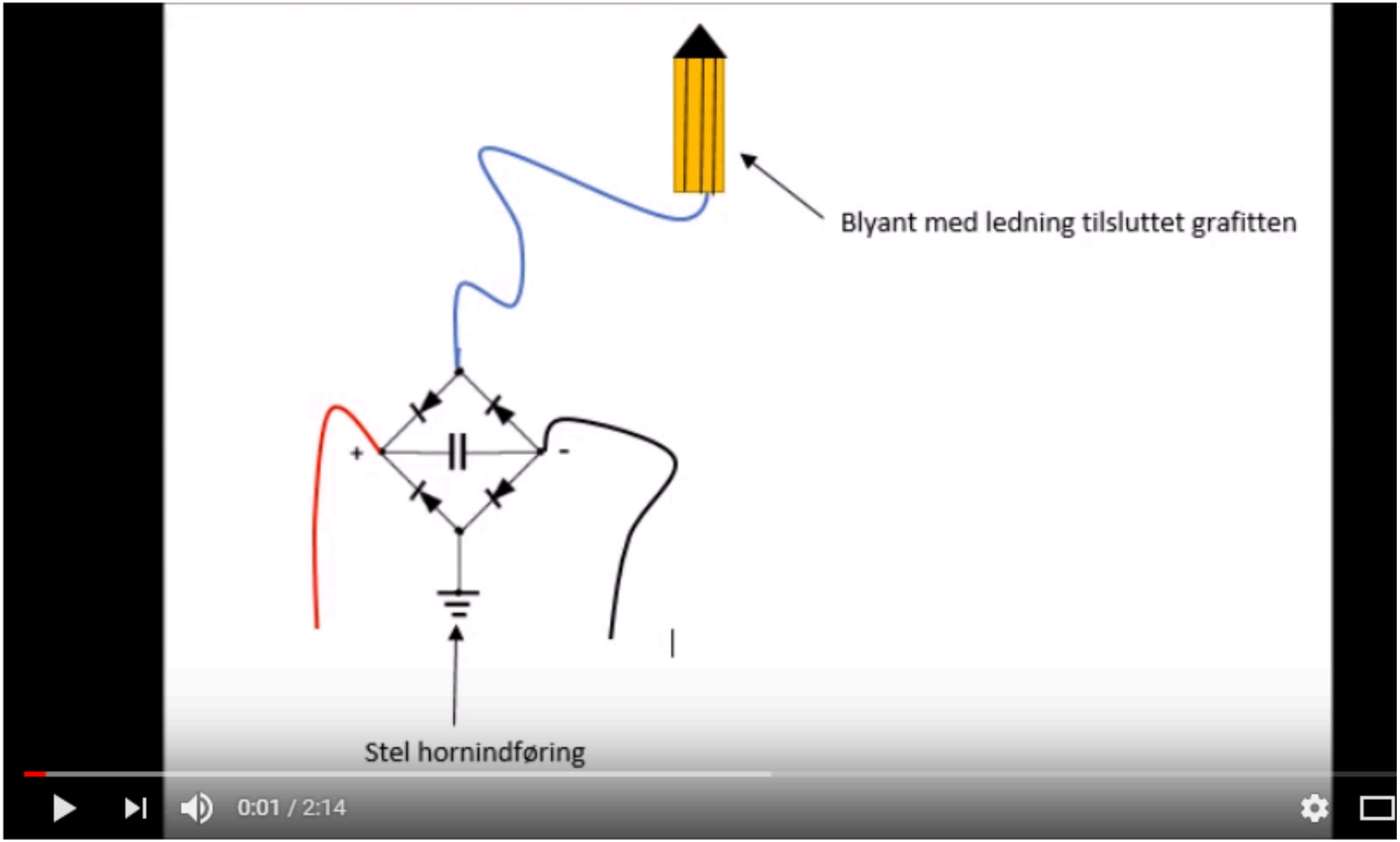
FOR THE SEEING OF THIS CLAIM IS WITH THE KNOWLEDGE OF THIS CLAIMANT AND THIS CLAIM'S – EXISTENCE.

:Atlan/:Amexem/:Turtle-Island/:Land-of-the-Frogs/:Land-Claim.



:Nanya-Shaabu:El
:Autochthon/:Plenipotentiary-Master
:Autograph/:Copyclaim ~2008.

:COPYCLAIM :AUGUST ~ 29 ~2008.
~1 OF THE ~1.



tesla radiant collector/ion collector with pencil